D R A F T

Air Resources Board's
Proposed State Strategy for California's
2007 State Implementation Plan

Release Date: January 31, 2007

California Environmental Protection Agency

Air Resources Board

Electronic copies of this document can be found on ARB's website at http://www.arb.ca.gov/planning/sip/sip.htm. Alternatively, paper copies may be obtained from the Public Information Office, Air Resources Board, 1001 I Street, Visitors and Environmental Services Center, 1st Floor, Sacramento, California 95814, (916) 322-2990.

For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette, or computer disk. Please contact ARB's Disability Coordinator at (916) 323-4916 by voice or through the California Relay Services at 711, to place your request for disability services. If you are a person with limited English and would like to request interpreter services, please contact ARB's Bilingual Manager at (916) 323-7053.

This document has been prepared by the staff of the California Air Resources Board. Publication does not signify that the contents reflect the views and policies of the Air Resources Board, nor does trade names or commercial products constitute endorsement or recommendation for use.

Please send written comments to:

Mr. Kurt Karperos, Chief
Air Quality and Transportation Planning Branch
California Air Resources Board
P.O. Box 2815
Sacramento, California 95812
Phone: (916) 322-0285
Fax: (916) 322-3646

For general questions, contact:

Mr. Ravi Ramalingam, P.E., Manager
Transportation Strategies Section
Phone: (916) 322-2085
Email: rramalin@arb.ca.gov

(This page intentionally left blank.)

Air Resources Board's
Proposed State Strategy for California's
2007 State Implementation Plans

TABLE OF CONTENTS

(This page intentionally left blank.)

EXECUTIVE SUMMARY

Introduction

The Air Resources Board's (ARB) 2007 State Implementation Plan (SIP) proposal is a comprehensive strategy designed to attain federal air quality standards as quickly as possible through a combination of technologically feasible, cost-effective, and far reaching measures. Mobile source measures are the heart of the strategy, with modernization of diesel fleets an essential near-term focus. Long-term strategies will also be necessary. The total magnitude of the reductions to be achieved through new actions is primarily driven by the scope of the air quality problems in the San Joaquin Valley and South Coast Air Basin. However, ARB's mobile source control program is statewide in nature and also provides most of the new reductions needed to meet and maintain federal air quality standards in Sacramento, San Diego, Ventura, the San Francisco Bay Area, and other local air districts.

Under State law, the Board plays two primary roles in the SIP process. The first is to deliver emission reductions from mobile sources, fuels, consumer products, and other sources under ARB jurisdiction. The second is to ensure California's compliance with federal Clean Air Act requirements. State law also establishes a process by which SIPs are developed at a regional level by local air districts, in coordination with transportation agencies, for ultimate approval by ARB and the U.S. Environmental Protection Agency (U.S. EPA).

When this process was put in place, emissions from stationary air pollution sources under air district jurisdiction contributed a greater share of the emissions than they do today. Now the landscape has changed, and actions by ARB, U.S. EPA, and international bodies are more critical than ever for attainment of ozone and particulate matter (PM2.5) air quality standards. In the case of the goods movement sector, increasingly California's most challenging air quality problem, port operators and others also play important roles.

Ideally, the shared responsibility for SIP development would result in a shared federal, state, and local vision of how best to attain air quality standards in California. However, given the complexity and severity of the problem, federal preemption issues, and tremendous funding needs, SIP development is more challenging than ever. This document presents ARB staff's view of where California stands in terms of compliance with the federal 8-hour ozone and PM2.5 standards and proposes a comprehensive new SIP strategy. This strategy will be difficult and expensive, but is necessary to protect public health. Staff believes all the measures we are proposing are technologically feasible and cost-effective. They will set the stage for further long-term actions.

The PM2.5 attainment deadline of 2015 is the most pressing issue to be resolved. The legacy fleets of diesel engines are the biggest contributor to the regional PM2.5 problem in the South Coast. This includes fleets of trucks, construction equipment, ships, harbor craft, and locomotives. The cleanup costs will be in the billions of dollars. Practical constraints will affect the pace of accelerated fleet turnover whether through regulation or incentive programs. ARB is prepared to take on the job of defining the necessary actions – but it is still an open question whether the 2015 deadline is achievable. More time may be needed to bring all locations into attainment.

The South Coast and San Joaquin Valley will need to take the full time allowable for ozone attainment which means a 2024 deadline. U.S. EPA guidelines require the necessary emission reductions to be achieved by 2023. In both cases, most of the air basin is expected to attain before that date, but the SIP must demonstrate that the last remaining violation sites would be in compliance.

It is imperative that we are successful in our efforts to meet air quality standards. The SIP process is a valuable planning mechanism to focus on that goal. A public dialogue is also important because of the stakes involved. This document is intended to provide key information for consideration in the public process. It outlines ARB staff's assessment of how far adopted regulations will take us towards attainment of federal standards, what new actions should be taken, timing of new technology, and the role of incentive funds. After additional public input is received, ARB staff will release a final proposal for Board consideration. The proposal will include ARB's new measures and enforceable emission reduction commitments, as well as actions that need to be taken by other agencies.

Statewide Ozone SIP Development

California has 8-hour ozone SIPs for 15 areas under development to meet the June 15, 2007 deadline for submittal to U.S. EPA. While a recent court decision raises some questions about the process, U.S. EPA has not yet responded to the decision or directed states to change course. ARB staff believes California should continue to proceed with the new SIPs so no time is lost while the federal government responds to the court decision. By completing the planning process now underway, we can ensure continued momentum in our efforts to improve ozone air quality in California. In addition, SIPs in California are routinely revised for a variety of reasons, including new technical information and control strategies. There will be opportunity to respond to any new SIP requirements once the legal processes are concluded.

ARB technical staff has worked closely with staff of air districts to develop emission inventories and air quality modeling for use in the ozone SIPs. California's ozone modeling has been conducted separately for two overarching regions: (1) Northern

and Central California and (2) Southern California. The northern/central modeling includes the San Joaquin and Sacramento Valleys, the San Francisco Bay Area, and mountain counties along the Sierra Nevada Mountains. The southern modeling region includes the South Coast Air Basin, Ventura County, San Diego, Imperial County, and the Mojave Desert area. Air quality studies done in each of the modeling domains provide data inputs for use in SIP modeling. With these two large modeling areas, the impacts of air pollution transport and upwind emission reductions can be accounted for in the SIP process.

The modeling results indicate that with the continued reductions in emissions on track to occur in each of the 15 areas, all but the San Joaquin Valley and the South Coast Air Basin will be able to show attainment by 2021 or earlier with identified measures. With additional reductions from ARB's proposed new strategies, the Sacramento region is projected to attain by 2019 with a reclassification from serious to severe. However, for the San Joaquin Valley and South Coast, substantially more reductions and time will be needed. The year 2021 has been used as a placeholder deadline for SIP development. ARB staff expects both regions to be reclassified as extreme with a 2024 deadline.

Mobile source programs will provide over 90 percent of the emission reductions that will occur between now and 2023 in the South Coast and the San Joaquin Valley. As we proceed with development of the near-term SIP measures, we will also work with air districts and others on long-term concepts that will be needed to reach ozone attainment in the South Coast and the San Joaquin Valley.

PM2.5 SIP Development

Both the San Joaquin Valley and South Coast are required to prepare PM2.5 SIPs for submittal to U.S. EPA by April 5, 2008. The San Joaquin Valley Air Pollution Control District is on track to meet that schedule. However, as the region's ozone SIP is being developed, both ARB and air district staff have considered the nature of the region's PM2.5 problem. This is necessary to ensure that the ozone SIP strategy will support PM2.5 attainment as well. The science indicates that reductions of nitrogen oxides (NOx) are relatively more beneficial for both ozone and PM2.5 attainment than other contributing pollutants. The San Joaquin Valley ozone SIP is being designed with this in mind. So while the PM2.5 SIP will follow later, the strategies are expected to be complementary. When the PM2.5 plan is complete, the air district plans to review the ozone strategy to ensure this is the case.

The South Coast Air Quality Management District has chosen to develop ozone and PM2.5 SIPs concurrently. While this process has provided some valuable information about the need for further NOx controls, ARB staff is recommending that

we make use of the available time to complete final PM2.5 SIPs for both South Coast and the San Joaquin Valley. The magnitude and scientific complexity of the problem, the need to replace legacy fleets of diesel engines, and the 2015 attainment deadline all come into play. This is the first time gridded aerosol PM2.5 modeling has been attempted for SIP purposes. The modeling incorporates complex atmospheric processes, and is supplemented with technical analyses to reconcile results with monitoring data. The multiple pollutants involved, the differences in pollutant contributions at various locations, and the sensitivity of the model's response to emission reductions all add to the complexity of the analysis. The District's 2014 NOx reduction target would require a 70 percent reduction from 2006 emission levels. Since diesel engines are the dominant NOx emissions source, massive fleet turnover to the cleanest engines would be needed to achieve reductions of that magnitude.

Overview of Proposed ARB Strategy

To attain federal standards in the San Joaquin Valley and South Coast it is essential to further reduce emissions from all mobile sources. Goods movement related emissions are of particular concern due to the growth and concentration of emissions in some communities. In April 2006, the Board adopted an emission reduction plan for statewide goods movement. That plan forms the core of the proposed new SIP measures and is currently being implemented. Along with reducing community exposures to diesel particulate, reducing statewide exposure to ozone and PM2.5 is a primary goal of ARB's emission reduction plan for goods movement. That plan is being implemented today.

The ozone SIP is linked to that effort through the emphasis on NOx reductions. ARB staff has used the results of SIP modeling for both ozone and PM2.5 to reassess the NOx emission reduction targets for two major rulemakings already underway – the rules for private truck fleets and construction equipment. These rulemaking activities are the first of their kind in the nation because they will require retrofit or early retirement of truck engines and construction equipment throughout California. These rules rely on the introduction of cleaner technology, and as a practical matter must take into account the timing of U.S. EPA's diesel engine standards and availability of newer, cleaner engines.

The NOx control component of U.S. EPA's new engine standards for diesel trucks takes effect in 2010. However, under the federal rules full NOx control for construction and farm equipment does not begin until 2014. Similar NOx controls for locomotive engines are under development by U.S. EPA, but not yet adopted. The timing of these federal new engine standards, combined with federal preemptions on locomotive controls, form a legal and practical framework that limits how much clean

up of diesel fleets in California can be accelerated. Another consideration is the typical lifetime of diesel engines which differs by engine application. Trucks, construction- equipment, farm equipment, and locomotives all have different useful lives, greatly affecting the economics of accelerated fleet turnover. Each of these considerations are evaluated and addressed in this plan and will be further evaluated in the rulemaking process.

Within certain limits, the federal Clean Air Act gives ARB the ability to adopt regulations more stringent than the federal government. ARB has a longstanding tradition of doing just that. Other states, and at times U.S. EPA, have followed our lead. Recently, California's unique ability to adopt more stringent mobile source requirements was questioned by some in Congress, but in the end both the need and the appropriateness of ARB's actions were recognized. In the public meetings on this issue, the thoroughness of the technical analyses and public processes used by ARB for the rulemaking process were acknowledged as strong rationales for maintaining our unique authority.

In the past few months, ARB staff has held public meetings to discuss the proposed SIP State Strategy, with the emphasis on identifying new measures for inclusion. After considering public input and reviewing the draft SIPs for the San Joaquin Valley and South Coast, we are proposing a list of new near-term measures for development and consideration by the Board. We have also proposed a list of concepts for long-term strategy development by ARB and others.

Furthermore, we identify efforts that are needed to integrate incentive funding mechanisms into the SIP State Strategy – this includes the Carl Moyer Program, the $1 billion air quality mitigation bond, and other State and federal funding programs. In the San Joaquin Valley, a coordinated effort is underway to develop additional incentive funds through the efforts of the San Joaquin Valley Partnership. As we refine ARB staff's proposal we will try to clarify as much as possible how incentive programs interface with our regulatory programs and how SIP credit can be granted.

Important national and international sources – ocean-going ships and aircraft – are only partially addressed in ARB staff's proposal due to practical and legal limitations. Aircraft emissions, which become one of the South Coast's top five NOx sources by 2020, are unaddressed due to the lack of effective international standards. The federal government needs to take a leadership role to represent our interests in the international standard setting process. We are proposing several measures to reduce ship emissions through a combination of ARB regulation, incentives, and actions by ports and the private sector. However, national and international action to clean up shipping fleets is also needed to fully meet our clean air goals.

Growth in vehicle travel is another issue that California air agencies can only partially address through trip reduction and indirect source rules. As vehicle travel increases, the benefits of ARB's mobile source regulations are diminished. Both the South Coast and San Joaquin Valley are facing a post-2021 horizon for meeting the ozone standard due to the severity of the remaining problem. This means the SIP must rely on the development of new technologies to provide new long-term reductions. Over the same timeframe, substantial population and vehicle growth is projected. How land use planners and transportation systems accommodate this growth will be primarily determined by local governments. Air quality goals need to be factored into these decisions.

ARB staff's proposed near-term SIP measures and strategies will provide new emission reductions from each of these emission categories:

- Diesel Truck Fleets
- Construction Fleets
- Passenger Vehicles
- Ships traveling and in-port
- Ship Fuels
- Port Trucks
- Harbor Craft
- Locomotive Fleets
- Consumer Products
- Evaporative and Exhaust Emissions
- Fuels
- Pesticides

The table below provides a list of proposed ARB regulations and other actions to reduce emissions from these categories. Most of the actions are regulatory, but incentives and voluntary steps will help accelerate clean up of existing diesel fleets.

Proposed ARB Regulations and Other Actions Needed

	ARB Regulation Proposed	Incentives/ Voluntary Action Needed	EPA Regulations Needed	National/ International Standard Needed
MOBILE FLEETS				
Statewide Truck Fleet	✓	✓	2010 standard	
Port Truck Fleets	✓	✓		
Construction, Agricultural and Other Fleets	✓		2014 standard	
Harbor Craft Fleets	✓		✓	
Cargo Handling Fleets	✓ (2005 rule)			
Forklifts and Other Fleets	✓ (2006 rule)			
Smog Check Improvements	✓ (BAR)			
Passenger Vehicle Early Retirement		✓		
Ship Fleets	✓	✓		✓
Ship Shore Power	✓	✓		
Ship Speed Limits	✓			
Locomotive Standards			✓	
Locomotive Fleets		✓		
Aircraft				✓
FUELS				
Ship Auxiliary Engine Fuel	✓ (2005 rule)			
Ship Main Engine Fuel	✓			
Harbor Craft Fuel	✓ (2005 rule)			
Locomotive Fuel	✓ (2004 rule)		2012 standard	
EVAPORATION & EXHAUST				
Gasoline Storage Tanks	✓			
Off-Road Recreational Vehicles	✓			
Recreational Boats / Watercraft	✓			
Portable Fuel Storage (Marine)	✓			
Gasoline Vapor Recovery Hoses	✓			
CONSUMER PRODUCTS				
Standards	✓			
Market Approaches	✓			
PESTICIDES				
DPR Pesticide Plan	✓ (DPR)			
Total Tons Per Day Impact in 2023 **South Coast** (ROG+NOx)	212 Tons per day	To Be Quantified	Locomotive Rule Pending	None Proposed
Total Tons Per Day Impact in 2023 **San Joaquin Valley** (ROG+NOx)	68 Tons per day			

As in previous SIPs, ARB's goal is to maximize the emission reductions from each strategy during measure development. During rule development new options can arise and are incorporated into the process. Sometimes these ideas can be incorporated immediately, in other cases more data will be developed before a concept proceeds to rulemaking. This iterative process has led to new ARB rule development and emission reductions with each new SIP. This is possible in large part due to the development of new technology over time, which is recognized in the Clean Air Act through provisions that allow for long-term measures.

ARB's concepts for long-term strategy development reflect the need to achieve further NOx reductions from mobile sources, as well as address the challenging category of consumer products that grows with California's population. We expect the nature of long-term strategies to evolve over time along with other societal changes. Positive actions by consumers can substantially affect the rate of progress and the magnitude of the challenge that remains.

From travel patterns to product choices, how California chooses to grow will make a difference. Local governments, transportation agencies, and the private sector need to join air agencies to define the long-term strategies needed to meet our public health goals and address quality of life issues. The federal government must also play a leadership role on a national and international basis. Long-term strategies ARB staff believes should be pursued include:

- Market based strategies for consumer products
- Incentives for low-emission technologies
- Efficient regional land use and transportation strategies
- Further vehicle technology advancements in engine design, after-treatment, and on-board diagnostics
- Further fuel improvements that complement low-carbon vehicle fuel
- Continued emphasis on water-based product formulations
- Targeted retirement of the dirtiest engines remaining in on-road and off-road fleets
- National/international NOx standards to reduce aircraft emissions (given the long engine life, standards need to be developed now)
- Further reductions in ship emissions through international standards
- Technology advancements in stationary source controls

These concepts are just a starting point. As we develop our proposed near-term measures we will continue to give thought to what more should be done longer term.

Mobile Source NOx Controls

ARB staff's proposed strategy reflects the importance of more mobile source NOx reductions for attainment of ozone and PM2.5 standards in South Coast and the San Joaquin Valley. Adopted rules provide most of the future reductions from passenger

vehicles, trucks, and construction equipment. For ships, ARB's new strategies would provide all the reductions since ships are not well controlled and emissions are growing. In contrast, ARB's stringent passenger vehicles standards are being implemented now, and fleet turnover provides substantial new reductions each year. Smog Check improvements, combined with early vehicle retirement, are essential new strategies for passenger vehicles. These strategies will provide both NOx and ROG reductions. Because Smog Check improvements can be implemented by 2010, these are important near-term actions to reduce vehicle emissions and public health impacts from California's passenger vehicle fleet. Implementing the proposed Smog Check improvements by 2010 would enable most of the benefits to be achieved by 2014.

For heavy-duty diesel trucks, natural fleet turnover to the cleanest engines does not begin until 2010. This makes accelerating introduction of cleaner engines into fleets that operate in California essential. Exploring ways to ensure these engines are maintained and do not produce excess emissions is the second measure in the proposed strategy. In developing the emission reduction estimates for the proposed measure for heavy-duty trucks, staff made simplifying assumptions. In the rulemaking process for the statewide private truck fleet rule already underway, a mix of PM retrofit and engine replacement strategies are being evaluated in terms of feasibility and cost-effectiveness. The results of these evaluations will frame staff's final proposal for Board consideration. The second proposed measure is at the concept stage and needs to be developed as part of the SIP implementation process.

The situation for construction fleets is similar – new federal NOx standards for off-road diesel engines do not take effect until 2014. ARB is developing a fleet rule for this category designed to reduce both diesel particulates and NOx emissions. Because of the timing of the federal standards, and California's inability to adopt new engine standards due to preemption, we cannot achieve all the necessary NOx reductions from this category by 2014. ARB staff is now developing a rule for Board consideration that is designed to maximize the emission reductions by 2014 in recognition of the PM2.5 deadline for South Coast and San Joaquin Valley.

Strategies for ships and locomotives are described below under the South Coast SIP discussion. The ship strategies are very significant for South Coast and the locomotive strategy is important for both regions.

New Measures and Reductions

The table below shows proposed new measures and estimated emission reductions (NOx and ROG) in 2023 for South Coast and San Joaquin Valley. The emission reductions are estimated for planning purposes based on the information at hand, and will be refined during measure development. Measures like early vehicle retirement rely on funding, some Smog Check improvements require authorizing legislation, and several ARB regulatory proposals for goods movement will occur in parallel with actions by ports and others.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

South Coast and San Joaquin Valley – 2023

	South Coast		San Joaquin Valley	
Proposed New SIP Measures	**NOx**	**ROG**	**NOx**	**ROG**
ON-ROAD SOURCES				
Passenger Vehicles	**7.1**	**10.5**	**2.1**	**3.3**
Smog Check Improvements (BAR)	6.9	7.5	2.1	1.9
Expanded Vehicle Retirement	0.2	0.5	0.0	0.1
Modifications to Reformulated Gasoline Program	--	2.5	--	1.3
Trucks	**18.3**	**1.7**	**21.2**	**1.7**
Cleaner In-Use Heavy-Duty Trucks	18.3	1.7	21.2	1.7
GOODS MOVEMENT SOURCES	**99.2**	**2.5**	**16.4**	**1.3**
Auxiliary Ship Engine Emission Reductions	30.8	--	--	--
Cleaner Main Ship Engines and Fuel	39.9	--	--	--
Port Truck Modernization	7.0	--	--	--
Accelerated Introduction of Cleaner Locomotives*	15.6	1.9	16.4	1.3
Clean Up Existing Harbor Craft	5.9	0.6	--	--
OFF-ROAD SOURCES				
Off-Road Equipment	**12.2**	**2.0**	**4.7**	**0.8**
Cleaner In-Use Off-Road Equipment (over 25hp)	12.2	2.0	4.7	0.8
Agricultural Equipment	**NYQ**	**NYQ**	**NYQ**	**NYQ**
Other Off-Road Sources	**2.4**	**42.9**	**0.6**	**11.8**
New Emission Standards for Recreational Boats	2.4	17.7	0.6	5.3
Expanded Off-Road Rec. Vehicle Emissions Standards	--	17.4	--	4.8
Portable Outboard Marine Tank Evap. Standards	--	4.0	--	0.7
Refueling Gas Storage Tank Evaporative Standards	--	2.1	--	0.7
Gas Station Fueling Hose Evaporative Standards	--	1.7	--	0.3
Above Ground Storage Tanks Enhanced Vapor Recovery	--	NYQ	--	NYQ
AREAWIDE SOURCES				
Consumer Products	**--**	**13.7**	**--**	**3.8**
Consumer Products Program	--	13.7	--	3.8
Pesticides	**--**	**NYQ**	**--**	**NYQ**
DPR Pesticide Plan			**--**	**--**
Total Emission Reductions from Proposed New SIP Measures	**139**	**73**	**45**	**23**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Department of Pesticide Regulation.

* Locomotive measure relies on US EPA rulemaking and industry agreement to accelerate fleet turnover.

Note: Emission reductions reflect the combination impact of regulations and supportive incentive programs.

San Joaquin Valley SIP

The San Joaquin Valley has experienced ozone levels exceeding the federal 8-hour ozone standard from 72 to 109 days per year between 2004 and 2006. The high values are 35 percent over the standard. The Valley has grown nearly 25 percent over the past 10 years and is traversed by two major highways that are critical California transportation corridors. Population exposure to ozone air pollution has decreased as emissions have been reduced, but the geography and climate make ozone an especially challenging pollutant to address. By comparison, annual PM2.5 pollution continues its steady decline consistent with the downward trend in emissions. The region now meets the current federal 24-hour PM2.5 standard.

In October 2006, the San Joaquin Valley Air Pollution Control District released a draft ozone SIP that left open the question as to when the Valley could feasibly attain the 8-hour ozone standard. The region is now classified as serious with a nominal attainment date of 2013. However, given the severity of the problem, the need for reclassification with a later attainment date was recognized as a key issue early in the SIP development process.

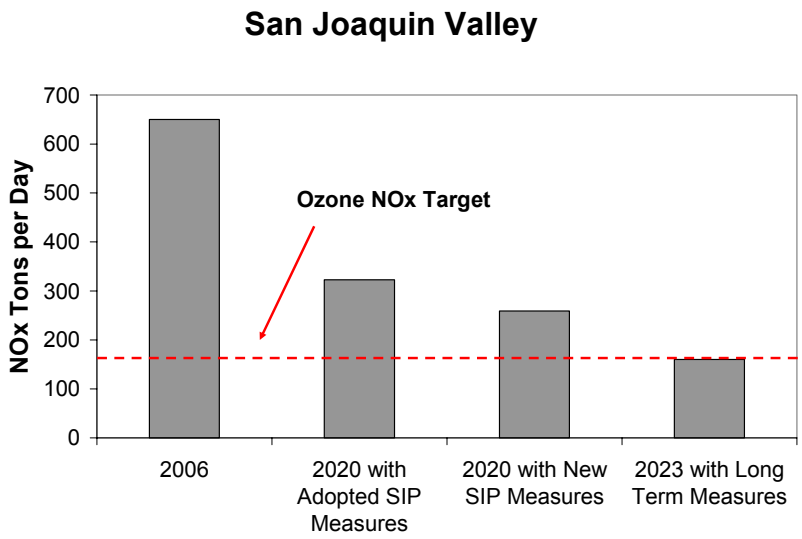
Ozone modeling has now been done with the final SIP emissions inventory. The modeling continues to show that NOx reductions are relatively more effective than ROG reductions. The targeted NOx emissions level for attainment ("carrying capacity") is 160 tons per day. Realistically, this puts the Valley in the 2021 or later timeframe for ozone attainment region-wide. While most communities are projected to attain the standards by 2021 or earlier, the SIP attainment date must reflect what it takes to bring the last remaining violation site down to the standard. Also, Clean Air Act requirements come into play. At the time a SIP is submitted to U.S. EPA, it must demonstrate that the measures necessary for attainment are or will be in place by the attainment date. Only areas classified as extreme can rely, in part, on new technology and long-term measures to be developed as part of the SIP implementation process.

The District's new draft plan has a targeted carrying capacity of 160 tons per day of NOx. The targets in the plan reflect continued reductions in both NOx and ROG, with a greater emphasis on NOx reductions as new engine technologies become available post-2010.

The ROG carrying capacity reflects new near-term ROG reductions but no new long-term ROG measures. However, as ARB develops new statewide long-term strategies additional ROG reductions will occur in the San Joaquin Valley. Current modeling indicates this would lessen the NOx reduction target by only a few tons. Comparing the carrying capacity to today's emission levels shows the magnitude of the problem and frames the analysis of the feasibility of potential attainment dates.

The figure below shows that reaching these emission levels requires new NOx reductions of about 75 percent. The combination of adopted and proposed new SIP

measures will provide about a 62 percent reduction. As a result, the San Joaquin Valley must rely on some long-term measures to reach the attainment target.

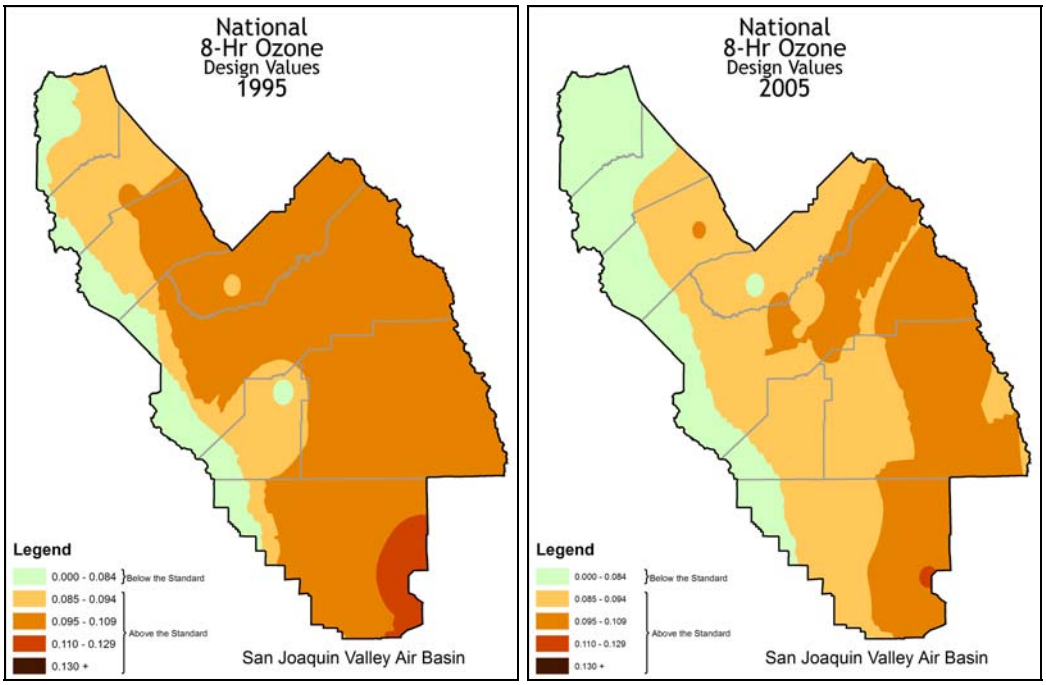


The federal Clean Air Act provides that the severity of a region's air quality problem be taken into account in establishing attainment dates. For the areas with the highest, most persistent ozone levels, the law also provides the option to move to an extreme classification which allows long-term strategies to deliver the last increment of emission reductions. In this case, it would be 18 percent of the total, or 87 tons per day. A change to an extreme classification is a decision made by states – which in California would be initiated by the governing board of an air district and approved by ARB. When it became clear that the San Joaquin Valley's current attainment date of 2013 was not feasible, the District staff requested ARB staff's assessment of the feasibility of demonstrating attainment by 2021, meaning emission targets would need to be achieved by 2020. The 2021 date was selected as the earliest potential date that would enable the region to avoid reclassification to extreme. The 2021 analysis equates to a classification of severe-17.

As part of the development of ARB's proposed SIP strategy, staff looked at possible scenarios that might be able to deliver the additional 87 tons per day for 2021 attainment with the certainty required by the Clean Air Act. A refined analysis would involve taking into account how the proposed SIP measures would be designed, so there is no double counting of emission reductions. Such an analysis is not simple since the most significant new NOx strategies involve retiring diesel engines at an accelerated rate and the SIP already takes these reductions into account. However, since the shortfall is large – 87 tons per day – a more broad brush analysis was performed. The approach was to assess if the shortfall could be covered by assuming complete replacement of mobile source fleets with the cleanest new technology standards that phase in from 2010-2014. Cost was not evaluated in this analysis, but legal authority was considered since SIP measures cannot be approved if a state lacks authority. The scenario assumed the following: no passenger vehicles older than ten years, all diesel trucks meeting 2010 standards, and all construction and farm equipment meeting 2014 standards. The result was an emissions level of

220 tons per day compared to the carrying capacity of 160 tons per day of NOx. About half of the remaining emissions, 103 tons per day, are from stationary sources. Based on these types of analyses, long-term measures that include new technologies for both mobile and stationary sources will be needed. This makes reclassification to extreme with a 2024 deadline necessary in ARB staff's view.

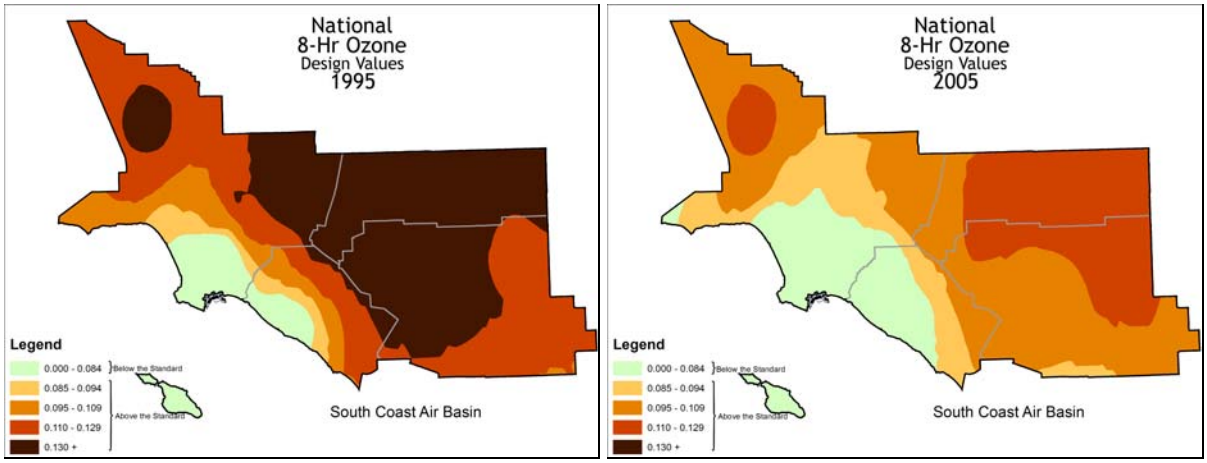
The extended deadline is necessary to bring the last predicted area, the community of Arvin, into attainment. While elevated levels at Arvin are not desirable, it will take more work to define the ultimate set of strategies to resolve that problem. As shown in the maps below population exposure has been decreasing over the last decade and we expect that trend to continue.



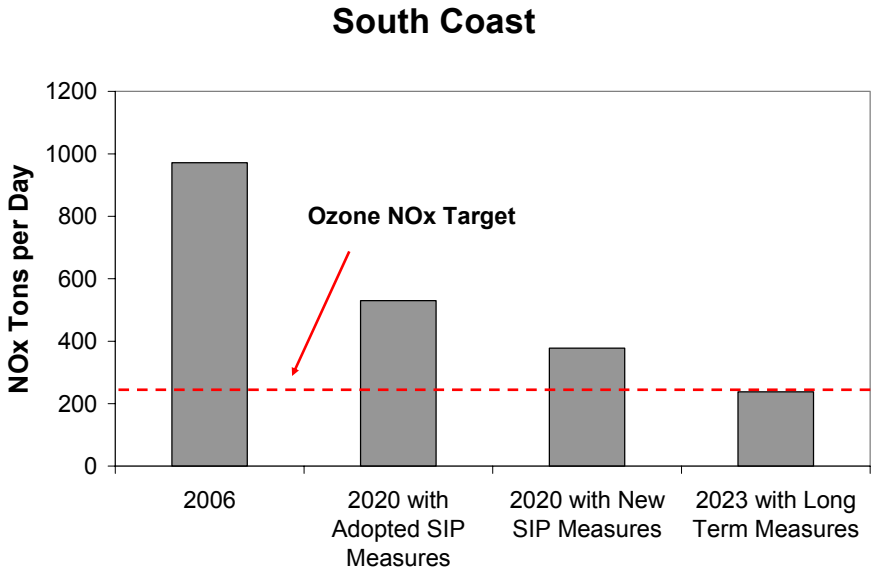
South Coast SIP

While long-term air quality progress in the South Coast has been dramatic, ozone and PM2.5 pollution levels still exceed federal air quality standards by a wide margin. ARB control programs for mobile sources, fuels, and consumer products have historically focused on the attainment needs of this region. The air quality status of the South Coast, and now the San Joaquin Valley as well, set the stage for development of ARB's 2007 SIP strategy.

The maps below show how ozone exposures have decreased. The peaks have shifted towards the eastern part of the air basin towards higher, less populated locations.

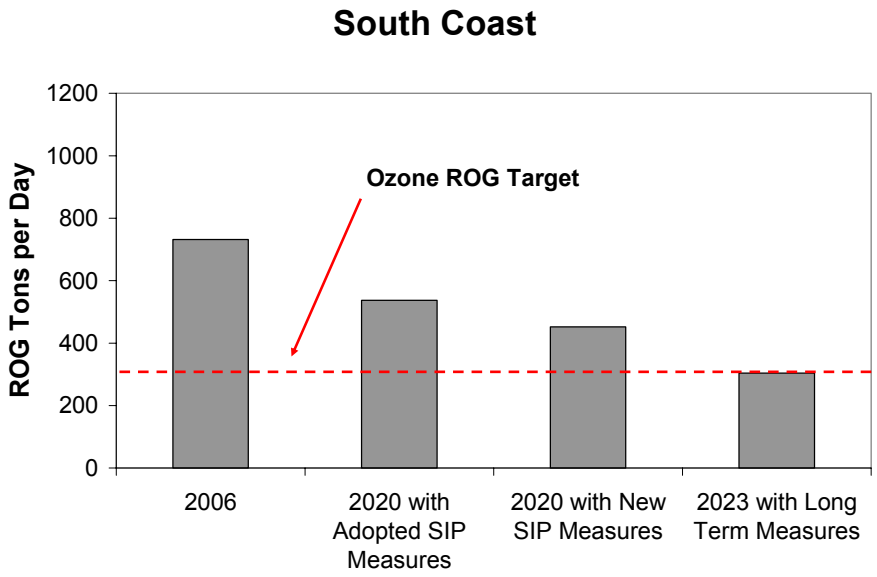


The South Coast AQMD's October 2006 draft plan included the District's carrying capacity estimates for both ozone and PM2.5 attainment. The ozone carrying capacities are 238 tons per day for NOx and 304 tons per day for ROG. For ozone, the region is currently classified as severe-17 with an attainment date of 2021. The draft plan acknowledges that the region would need to be reclassified to extreme in order to rely on long-term concepts as provided by section 182(e)(5) of the Clean Air Act. Based on modeling analyses, the District selected ozone carrying capacities that would require roughly equal NOx and ROG reductions from long-term concepts. ARB staff considers the mix between long-term NOx and ROG to be a placeholder assumption that will change over time as near-term SIP measures are implemented, long-term concepts developed, and the SIP periodically revised.



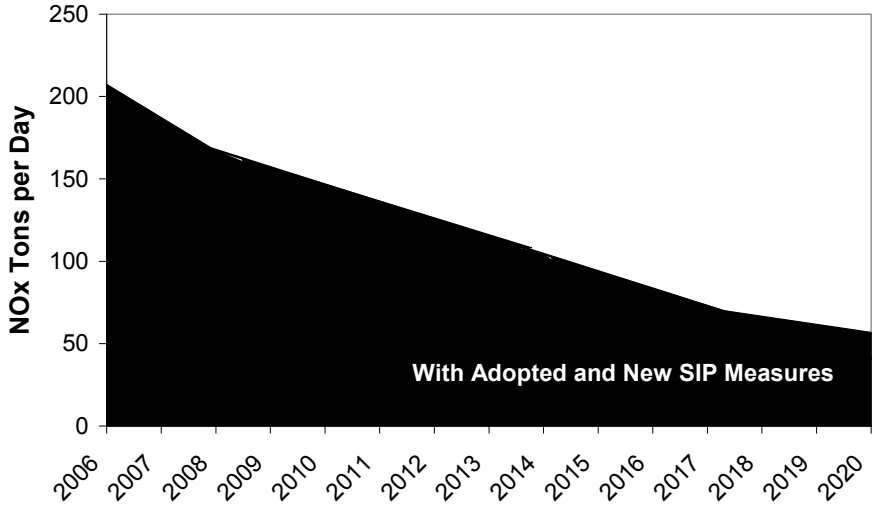
The figure above shows that from today's levels about a 75 percent reduction in NOx is needed for ozone attainment. ARB's SIP strategy, including adopted and proposed SIP measures, will provide about a 60 percent reduction in NOx by 2020, and 65 percent reduction by 2023. Long-term concepts are needed to achieve an additional 114 tons per day of reductions, requiring an extreme classification with a 2024 attainment deadline.

With the estimated ROG carrying capacity of 304 tons, an additional 139 tons per day will be needed from long-term measures as shown below. In the end, a smaller proportion of ROG than NOx reductions may be targeted based on future technology advancements, feasibility and cost-effectiveness.

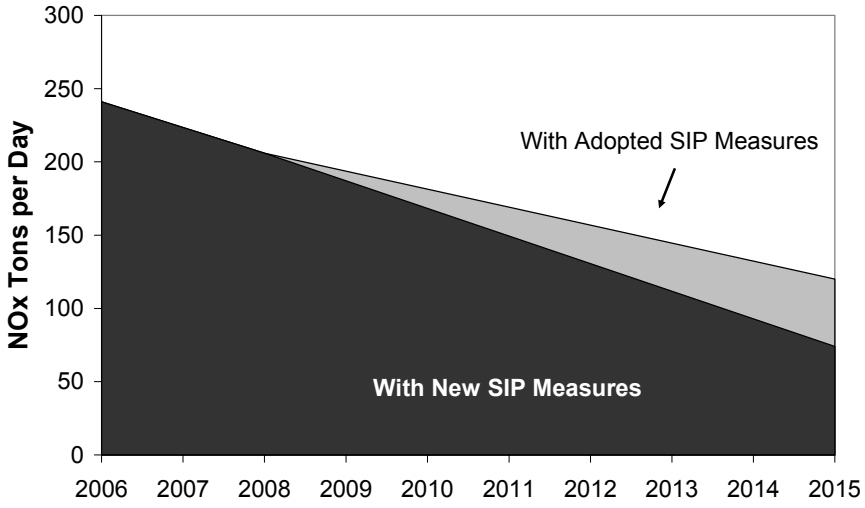


The benefits of ARB's mobile source NOx strategy in the South Coast are evident when emissions trends are evaluated. The figures below show how adopted measures are reducing emissions, and how ARB's proposed new measures will provide additional near-term reductions. The first figure shows how passenger vehicle emissions are decreasing even with continued growth in vehicle travel. The next figure shows how diesel truck emissions decrease over time as cleaner engines enter the fleet. This is represented by the top line. With the estimated benefits of ARB's truck fleet rule now under development, emissions would drop by another 32 tons per day by 2015. With this new rule, 2015 emissions would drop a total of 24 percent.

South Coast Passenger Vehicle Emissions-NOx



South Coast Truck Emissions - NOx

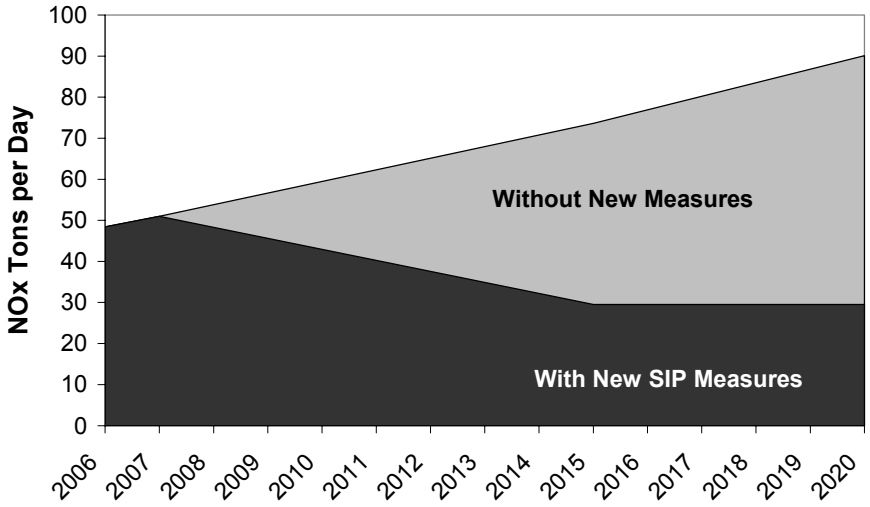


Emissions from ports and goods movement pose a significant challenge for attainment in the region. Ship emissions are a large and growing emissions category, trucks servicing the ports are older and dirtier than the average fleet, and ARB regulation of line haul locomotives is largely preempted by federal law. NOx emissions from these categories contribute to regional ozone and PM2.5 pollution, direct diesel particulate emissions are of special concern to local communities, and SOx emissions from ships contribute to PM2.5 levels.

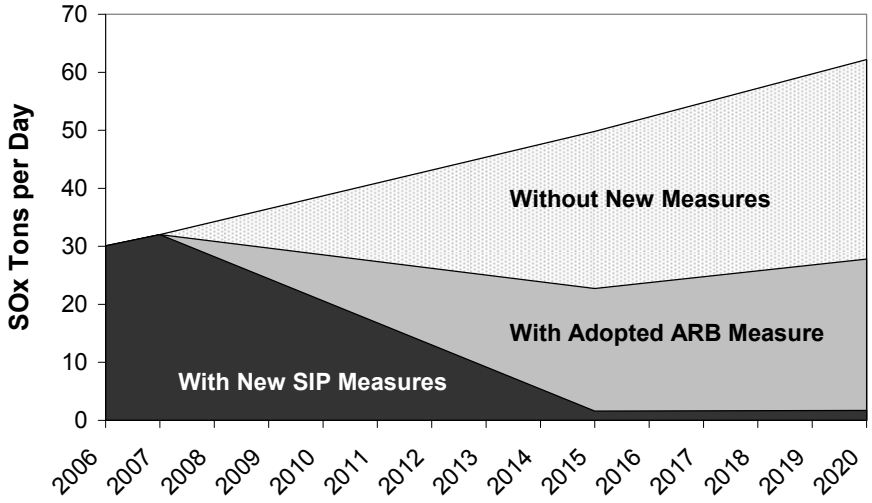
ARB's SIP strategy includes new measures for these key sectors, a number of which are already under development. In aggregate, these strategies provide the greatest benefit in the South Coast as a result of multiple measures to reduce emissions at ports and from ocean-going ships and harbor craft.

The figures below show the combined benefits of several proposed ARB strategies to reduce ship emissions both in port and in transit. The NOx reductions are needed for ozone and PM2.5 attainment. The SOx reductions are essential for PM2.5 attainment.

South Coast Ship Emissions - NOx

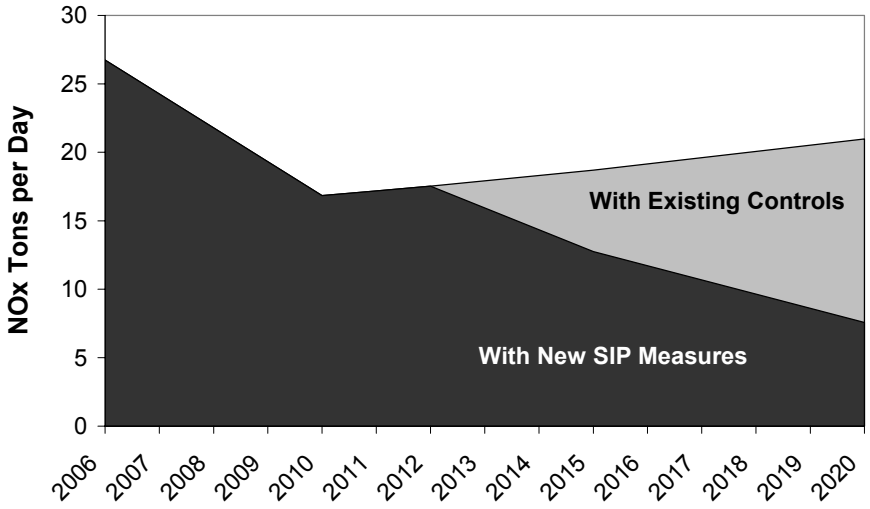


South Coast Ship Emissions - SOx



Locomotives pose a difficult challenge due to their long life, interstate operations, and California's reliance on U.S. EPA to adopt new engine standards. Several strategies are underway to clean up locally-based switcher engines, reduce idling emissions at railyards, and concentrate the cleanest available line haul engines in South Coast. These activities are important for community health and NOx emission reductions between now and 2015. However, with growth, locomotive NOx emissions will increase by 2020 without further action. ARB's SIP strategy proposes U.S. EPA adoption of more stringent new engine standards and a new industry commitment to accelerate introduction of cleaner engines in California to meet the attainment needs of the South Coast and the San Joaquin Valley. The figure below shows the benefits of ARB's proposed strategy for locomotives.

South Coast Locomotive Emissions - NOx



Although PM2.5 SIPs are not due this year, the South Coast's draft plan includes emissions targets for PM2.5 attainment. Developing these targets has posed technical challenges since this is the first time comprehensive PM2.5 modeling has been attempted for SIP purposes. The technical staff of ARB and U.S. EPA consulted with the South Coast staff on PM2.5 modeling approaches. The District's gridded aerosol modeling indicates PM2.5 attainment will be more difficult than is indicated by evaluating current air quality and emissions trends.

Annual PM2.5 air quality shows a consistent downward trend that parallels the downward trend in emissions. The District's modeling does not predict this relationship will hold, resulting in a more stringent emission reduction target than a "linear rollback" analysis would indicate. If the SIP were due now, ARB staff would recommend proceeding with the more stringent targets. However, given the complexity of PM2.5 formation and the inherent uncertainties in modeling, staff believes further technical analyses would improve our understanding of both the problem sites and the benefit of various strategies.

For example, while the District's proposed PM2.5 strategy appropriately focuses on regional atmospheric formation of PM2.5, ARB staff believes the district should further evaluate directly emitted particles in the eastern part of the region where attainment appears to be most difficult. If additional local controls could be identified, attainment might be expedited.

Based on ARB staff's analysis, most of the region is projected to reach attainment by 2015. More needs to be done to demonstrate attainment in eastern portions of the air basin. The combination of adopted SIP measures and ARB's proposed new measures would reduce South Coast NOx emissions by 475 tons per day by 2014. Adopted measures provide 350 tons per day of reductions. ARB's proposed new measures would reduce NOx emissions from diesel engines in the goods movement sector, construction industry, and other businesses by about another 110 tons per day by 2014. Smog Check improvements would provide 22 tons per day of reductions, about half of which are NOx reductions. ARB's proposed strategy also includes new reductions in SOx, direct PM2.5, and ROG that will aid in PM2.5 attainment.

Long-term emission reductions of ROG will be needed for ozone attainment in the South Coast. Consumer products and evaporative emissions from mobile sources, solvents, and coatings are all important emission categories. ARB and the District will need to jointly identify new strategies for these categories as part of the SIP implementation process.

Benefits of Adopted and Proposed SIP Measures

The tables below provide a summary of how much the adopted and proposed new SIP measures combined will reduce today's emissions in South Coast and San Joaquin Valley by 2023, the year emission reduction targets must be met for extreme ozone areas.

South Coast NOx

	NOx Tons Per Day		Percent of Total Reductions
	2006	2023	
Stationary/Area (Local)	87	54	5%
On-Road (California)	526	129	64%
Off-Road (California)	262	95	27%
Locomotives (National)	31	12	3%
Ships (National / International)	51	33	3%
Aircraft (National / International)	16	29	2% increase
Total	972	352	

South Coast ROG			
	ROG Tons Per Day		Percent of Total Reductions
	2006	2023	
Stationary/Area (Local)	158	153	2%
Consumer Products (California)*	101	96	2%
On-Road (California)	264	92	60%
Off-Road (California)	197	84	39%
Locomotives (National)	3	1	1%
Ships (National / International)	1	3	1% increase
Aircraft (National / International)	8	13	2% increase
Total	732	443	

* Long-term strategy to be developed
Numbers may not add up due to rounding.

San Joaquin Valley NOx			
	NOx Tons Per Day		Percent of Total Reductions
	2006	2023	
Stationary/Area (Local)	128	107	5%
On-Road (California)	361	81	69%
Off-Road (California)	136	46	22%
Locomotives (National)	22	6	4%
Ships (National / International)	0	1	<1% increase
Aircraft (National / International)	3	5	<1% increase
Total	650	247	

Numbers may not add up due to rounding.

San Joaquin Valley ROG			
	ROG Tons Per Day		Percent of Total Reductions
	2006	2023	
Stationary/Area (Local)	254	237	16%
Consumer Products (California)*	24	26	2% increase
On-Road (California)	99	37	58%
Off-Road (California)	66	33	31%
Locomotives (National)	2	0	2%
Ships (National / International)	0	0	0%
Aircraft (National / International)	7	11	4% increase
Total	452	345	

* Long-term strategy to be developed
Numbers may not add up due to rounding.

These tables also show the importance of NOx emission reductions from the mobile sources primarily subject to ARB regulation, off-road sources subject to national or international standards, and stationary and area sources under local air district jurisdiction.

Emissions from locomotives and aircraft show an increase. Ship emissions would be increasing without California's efforts to reduce emissions through a combination of ARB regulation, incentives, port actions, and voluntary strategies. In 2023, mobile sources represent about 85 percent of NOx emissions in South Coast and about 60 percent of the NOx emissions in the San Joaquin Valley.

The rate ROG emission reductions by 2023 is less than that for NOx in both regions. In the South Coast population-driven emissions growth for consumer products overtakes the benefits of ARB regulations. In the San Joaquin Valley, ROG from livestock operations decreases but remains the largest category.

ARB's 2007 Proposed State Strategy, including air district measures, provides for about 90 percent of the new NOx reductions needed in the South Coast by 2023, the year emission reduction targets must be met for extreme ozone areas, based on draft carrying capacities. This sets the stage for development of long-term strategies for both NOx and ROG. In the South Coast, the current combination of ROG and NOx carrying capacities would require very substantial new ROG reductions. As long-term strategies are developed during the SIP implementation and update process, carrying capacities will be revisited. The San Joaquin Valley carrying capacities rely more heavily on NOx reductions with ARB's proposed strategy providing about 80 percent of the needed reductions by 2023.

With the South Coast's current estimate of carrying capacity for PM2.5, more reductions are needed to demonstrate attainment by 2015. However, attainment by 2021 could be achieved with the adopted and proposed SIP measures. The delay in achieving the necessary reductions is primarily the result of the timing of federal diesel engine controls combined with inadequate international standards for ocean-going ships. For example, federal Tier 4 off-road engines will not be introduced until model year 2014, and no new international standards for ships proposed. This is the most critical outstanding issue to be addressed as SIP development proceeds. ARB staff believes that a cooperative effort among local, state, federal agencies to resolve this issue is necessary to serve the best interests of the region's breathing public. The next few months should be used for this purpose and to complete the PM2.5 planning process.

(This page intentionally left blank.)

1. BACKGROUND

General SIP Requirements

California's 2007 State Implementation Plans (SIPs) are a combination of State and local air quality planning documents that must show how California will meet federal the 8-hour ozone standard statewide. The San Joaquin Valley, South Coast Air Basin, Sacramento region, San Diego, Ventura, and a number of air districts downwind of urban areas are nonattainment for the ozone standard. Ozone SIPs must be submitted to the U.S. Environmental Protection Agency (U.S. EPA) by June 15, 2007. The final statewide SIP will include ARB's emission reduction strategy for sources of pollution under State and federal authority, and, from every local region not meeting federal standards, a plan containing a strategy for reducing emissions from sources under local air district control.

The ozone SIPs must include an attainment demonstration and show that there will be steady progress in reducing emissions during the years leading to the attainment date – equal to about 3 percent per year. Plans need to meet federal completeness criteria, which includes evidence of commitment, legal authority, enforceability, and ability to fund emission control measures. Technical requirements must also be met regarding emissions inventory, air quality data, and modeling of future year air quality.

In addition to ozone SIPs, the South Coast and San Joaquin Valley must prepare PM2.5 SIPs for submittal to U.S. EPA by April 5, 2008. For the South Coast Air Basin, the South Coast Air Quality Management District is developing a PM2.5 SIP in parallel with the ozone SIP. The San Joaquin Valley PM2.5 SIP in on track to be submitted in 2008.

The 2007/2008 ozone and PM2.5 SIPs are another step in the air quality planning process that over the years has helped define new actions to improve California's air quality. ARB has adopted a series of regulations over the past 10 years to implement measures in the 1994 ozone SIP, as well as additional new ARB measures identified in the 2003 SIP update. New mobile source regulations, reformulated gasoline, and multiple consumer products regulations envisioned in these SIPs have been adopted and are being implemented today. And, while California has serious air quality challenges ahead, it is important to recognize the progress made as a result of California's landmark air pollution control programs. With that experience and history of success, we need to continue to do more. ARB staff recognizes the importance of the new State measures and are proposing a full slate of new measures for development and consideration by the Board.

National Air Quality Standards

The U.S. EPA adopts standards for ambient (outdoor) air pollutants designed to protect public health. Extensive studies on the health effects of air pollution worldwide have confirmed the importance of continuing to reduce people's exposure to air pollution. U.S. EPA is required to review its air quality standards every five years.

In July 1997, the federal government announced new national ambient air quality standards (NAAQS) for the pollutants ozone and particulate matter (PM). The new standards provide more protection from the harmful health effects of these pollutants. The ozone standard was revised to protect against longer pollutant exposure periods by requiring that ozone concentrations not exceed specified levels over an 8-hour period instead of a 1-hour period. A new particulate matter standard was added to protect against the smaller inhalable particles, less than two microns in diameter (PM2.5). Air quality standards have become more stringent over time as new studies have shown adverse health effects at lower levels. The standards below are the current benchmark for federal SIP requirements. U.S. EPA is currently reviewing the adequacy of the current 8-hour standard. And in December 2006, U.S. EPA adopted a more stringent 24-hour PM2.5 standard of 35 micrograms per cubic meter. This will likely mean that several new areas will be required to prepare a plan to attain the newer standard. Initial State recommendations for nonattainment areas are due in late 2007, with final nonattainment areas determined by U.S. EPA in early 2010. Plans for the revised 24-hour standard will be due in 2013, with attainment dates to be determined after U.S. EPA issues transition guidance.

Ozone Standard

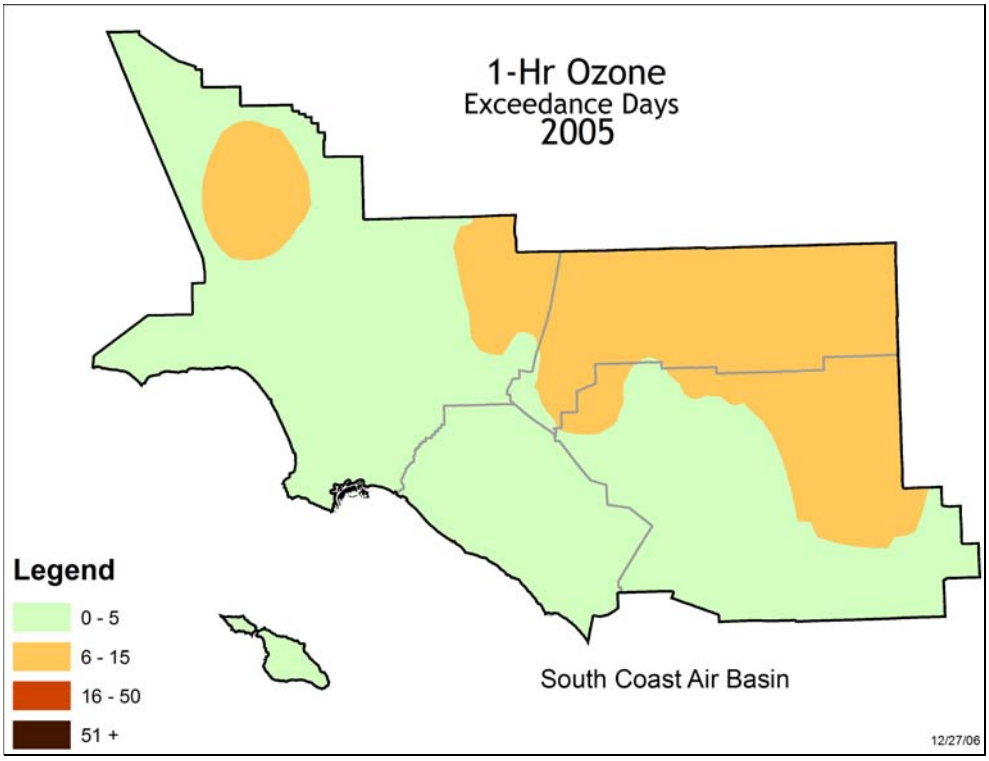
0.08 parts per million for 8 hours, not to be exceeded, based on the fourth highest concentration averaged over three years.

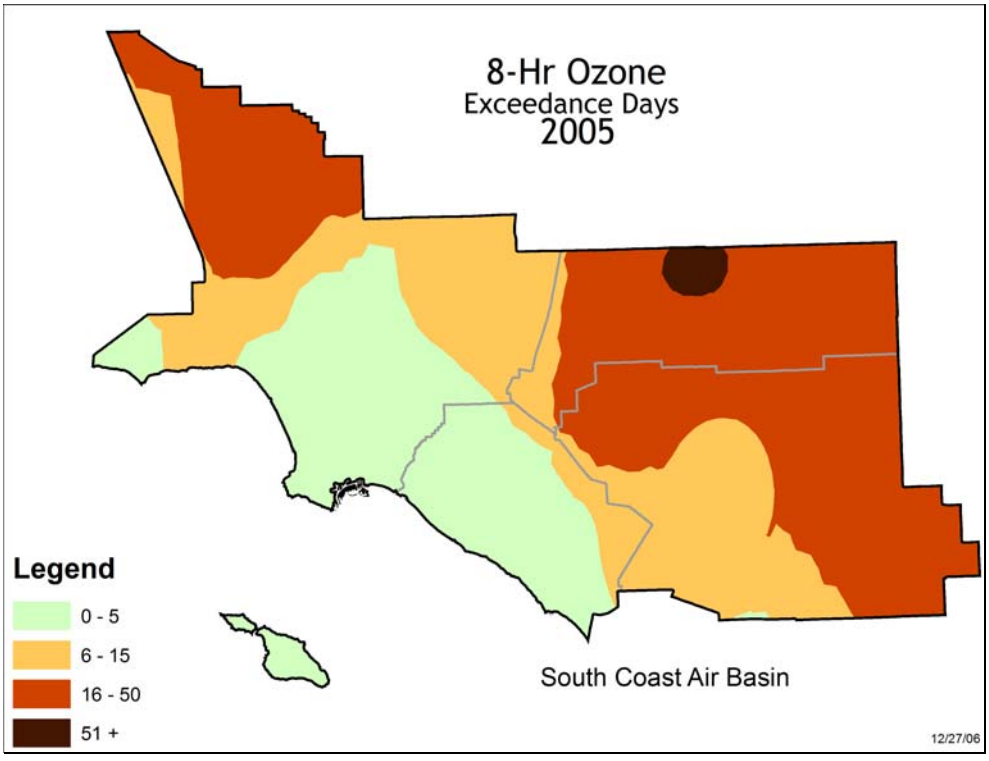
PM 2.5 Standards

65 micrograms per cubic meter for 24 hours, not to be exceeded, based on the 98th percentile concentration averaged over three years, *and*
15 micrograms per cubic meter annual average (arithmetic mean) averaged over three years.

How much more stringent is the 8-hour ozone standard than the 1-hour ozone standard? The two maps on the following page illustrate a dramatic difference in exceedance days (number of days that violated the standard) for the 1-hour standard versus the 8-hour standard in the South Coast air basin in 2005. While many areas of California continue to be in violation of federal air quality standards, real air quality progress has been made, as we will illustrate later. The clean air bar simply continues to be raised as we learn more about the health effects of air pollution.

Comparison of 1-Hr Ozone Standard and More Stringent 8-Hr Ozone Standard in the South Coast Air Basin





Health Effects of Ozone and PM2.5

Ozone

The formation and health impacts of ozone are very well studied. Ozone is a highly reactive gas that forms in the atmosphere through complex reactions between chemicals directly emitted from motor vehicles, industrial plants, consumer products and many other sources. It forms in greater quantities on hot, sunny, calm days making the summer season the key exposure period.

Considerable research over the past 35 years has investigated how people respond to inhaling ozone. These studies have consistently shown that ozone can lead to inflammation and irritation of the tissues lining the human airways. This causes the muscle cells in the airways to spasm and contract, thus reducing the amount of air that can be inhaled. Symptoms and responses to ozone exposure vary widely, even when the amount inhaled and length of exposure is the same. Typical symptoms include cough, chest tightness, and increased asthma symptoms. Ozone in sufficient doses can also increase the permeability ("leakiness") of lung cells, making them more susceptible to damage from environmental toxins and infection.

Medical studies of large populations have found that ozone exposure is associated with an increase in hospital admissions and emergency room visits, particularly for lung problems such as asthma and chronic obstructive pulmonary disease. Several studies have also associated ozone exposure with increased premature mortality in elderly people with chronic diseases of the lungs and circulatory system.

People who exercise or work outdoors are at greater risk of experiencing adverse health effects from ozone exposure because they inhale more ozone. Current evidence has linked the onset of asthma to exposure to elevated levels of ozone in exercising children. Children and adolescents are at increased risk because they are more likely to spend time outdoors engaged in vigorous activities than adults and because they inhale more ozone per pound of body weight.

PM2.5

Particulate matter (PM) air pollution is also well studied. Particulate matter pollution is a complex mixture that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. PM can be directly emitted into the air in forms such as dust and soot. It can also be formed in the atmosphere from the reaction of various gases. Particulate matter is less than 10 microns in diameter (a micron is one-millionth of a meter) and is called PM10. Even smaller particles, those 2.5 microns or less in diameter, are called "fine particles" or PM2.5, and are the target of this SIP. PM2.5 is a component of PM10.

Extensive research has shown that PM can be inhaled into the deep portions of the lungs. Some inhaled particles are exhaled again, but others deposit in the lungs, which can lead to inflammation in both the lungs and the circulatory system. PM2.5 poses an increased health risk because it can penetrate deeper into the lungs and may also enter the bloodstream.

Population-based studies in hundreds of cities around the world have demonstrated a strong link between elevated particulate matter levels and premature death in people with pre-existing heart or lung disease. The two most important of these studies were performed in many cities in the United States, and have been ongoing for over 15 years. Both of these studies found a strong relationship between long-term PM exposure and premature death.

Scientists have observed higher rates of hospitalization, emergency room visits and doctor's visits for respiratory illnesses or heart disease during times of high PM concentrations. During these periods of high PM levels, scientists also observed the worsening of both asthma symptoms and acute and chronic bronchitis, and reductions in various measures of lung function.

The elderly and people with heart and/or lung diseases are particularly at risk of experiencing adverse effects from PM exposure. Studies have also shown that children may be particularly vulnerable to PM effects. There is evidence from the 10-year Children's Health Study funded by the ARB that in communities with high levels of PM children's lungs develop more slowly and that at maturity they tend to have lower lung capacity than children who grow up in communities with lower levels of PM. Just as with ozone, children and infants may also be more at risk of experiencing adverse effects from PM because they inhale more air per pound of body weight than do adults, they breathe faster, and have smaller body sizes. In addition, there is some evidence that children's immature immune systems may cause them to be more susceptible to PM than adults.

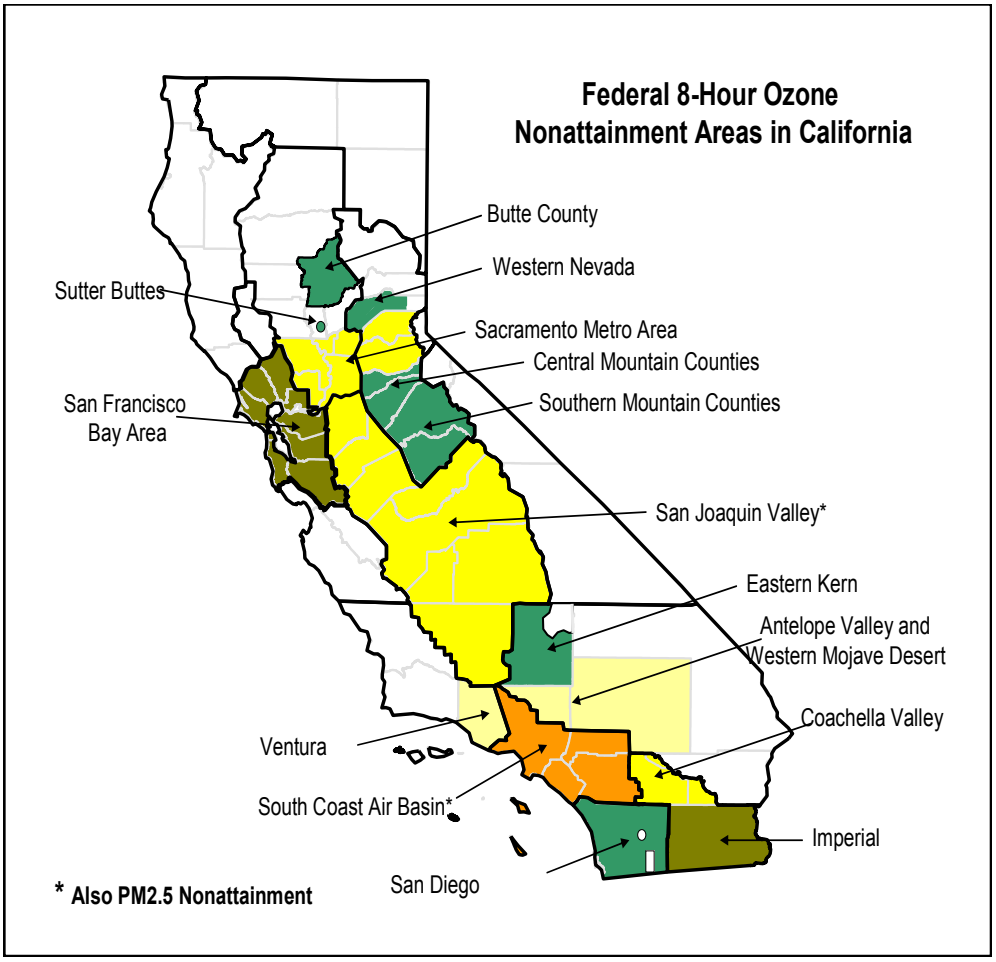
Nonattainment Areas and Air Quality Trends

Geographic areas that exceed a federal air quality standard are called nonattainment areas. A comprehensive network of monitoring stations throughout California measures air quality and provides the data necessary to determine whether an area meets or exceeds federal ozone and PM2.5 air quality standards.[1]

Compliance with the federal ozone and PM2.5 standards is based on pollutant concentrations, measured at a comprehensive network of monitoring stations throughout California, averaged over three years. These three-year averages are called *design values*. Air quality monitoring in the years 2001 through 2003 was used by

[1] More about California's air quality monitoring network can be found on ARB's website at: *http://www.arb.ca.gov/aaqm/aaqm.htm*

U.S. EPA to designate 15 areas in California as nonattainment for the federal 8-hour ozone standard. The San Joaquin Valley and South Coast Air Basin are also nonattainment for PM2.5.



A specific year's design value is averaged over three years. For example, the design value for the year 2001 reflects the averages for the years 1999, 2000, and 2001. Ozone design values are an average of the fourth highest concentrations for each of the last three years. Design values for the PM2.5 annual average reflect annual average (arithmetic mean) concentrations averaged over the last three years. The PM2.5 24-hour design values reflect the 98th percentile concentrations averaged over the last three years.

For the ozone standard, areas are classified based on the severity of the problem. In descending order in terms of magnitude of the problem, the classifications are *extreme*, *severe*, *serious*, *moderate*, and *marginal*. The Clean Air Act provides more time to meet the standard based on the severity of the problem. Based on its classification an area is given an attainment deadline. A special designation, called *basic*, refers to nonattainment areas governed under a separate set of requirements in the Clean Air Act. The current designations may be affected by a recent court decision. This issue will be further discussed in our final 2007 SIP proposal. For PM2.5, U.S. EPA simply designated the South Coast and San Joaquin Valley as nonattainment without

application of the classification scheme used for PM10. This results in an attainment deadline of 2015.

Ozone Nonattainment Area	Nonattainment Designation (Current / Anticipated)	Attainment Year (Current / Anticipated)
South Coast Air Basin	Severe / Extreme	2021 / 2024
San Joaquin Valley	Serious / Extreme	2013 / 2024
Coachella Valley	Serious / Severe	2013 / 2019
Sacramento Region	Serious / Severe	2013 / 2019
Antelope Valley and Western Mojave Desert	Moderate / Severe	2010 / 2019
Ventura County	Moderate / Serious	2010 / 2013
Imperial County	Marginal	2007
San Francisco Bay Area	Marginal	2007

The above table lists the marginal through extreme nonattainment areas for the federal 8-hour ozone standard, while the table to the right lists the areas with the special basic ozone nonattainment designation. The Clean Air Act allows changing of nonattainment designations and the extension of the attainment deadline if the State believes a change is needed after analyzing the nature of the ozone problem and challenges to meet the standard. So the above table includes the current attainment designations, as well as designation changes that may be needed based on preliminary analyses.

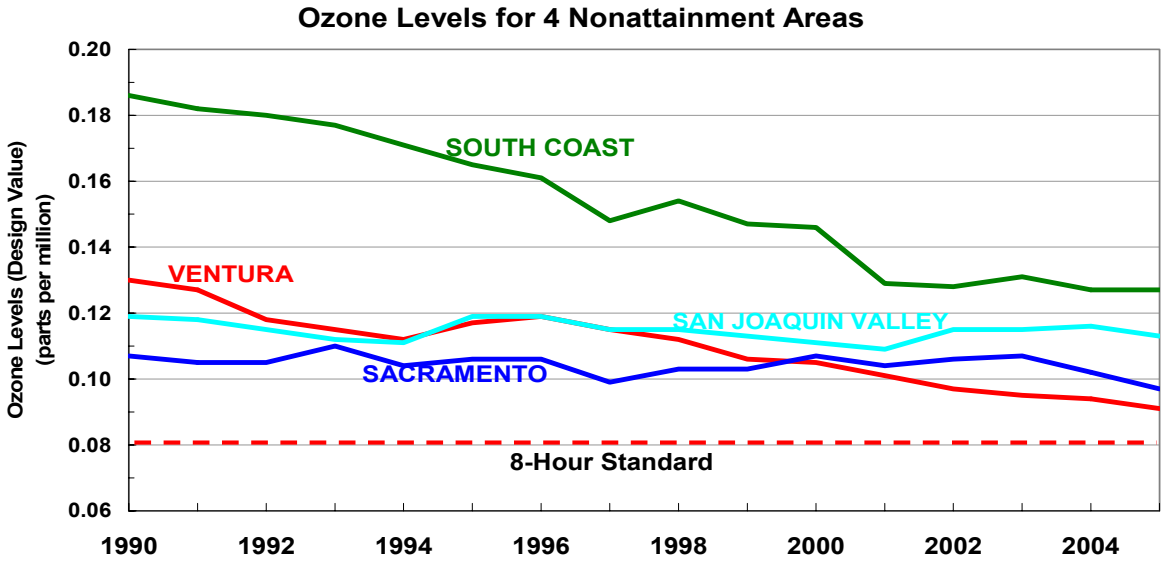
Basic Ozone Nonattainment Areas Attainment Year 2009-2014
Butte County
Central Mountain Counties
Eastern Kern County
San Diego County
Southern Mountain Counties
Sutter Buttes
Western Nevada County

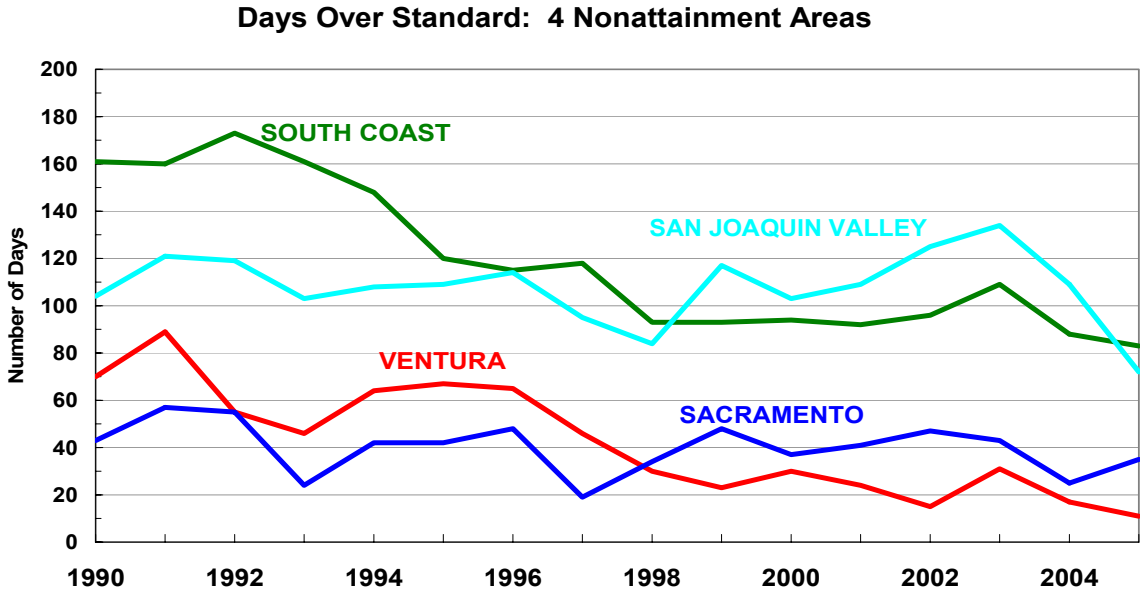
For this set of SIPs, U.S. EPA has provided guidance on how to interpret the attainment deadline as it relates to attainment demonstrations. The question arises because the deadlines are mid-year. The ozone attainment deadline is June 15 and the PM2.5 deadline is April 5 of the attainment year. To address the issue, U.S. EPA guidance calls for the analysis of attainment to be done for the year prior to the actual attainment year. For consistency and simplicity, however, this document refers to emission reduction targets by the actual attainment year. For example, for an extreme nonattainment area with an attainment year of 2024, the emission reduction target is also listed for 2024, even though the emission reduction targets are based on emissions in 2023.

Ozone Trends

A snapshot of four ozone nonattainment areas on the next page shows ozone levels (design values) relative to the federal standard and number of days over the standard since 1990. The ozone levels chart gives a sense of recent progress toward meeting the standard as well as how far we still have to go. The San Joaquin Valley and the South Coast have the most days exceeding the standard and the South Coast has the

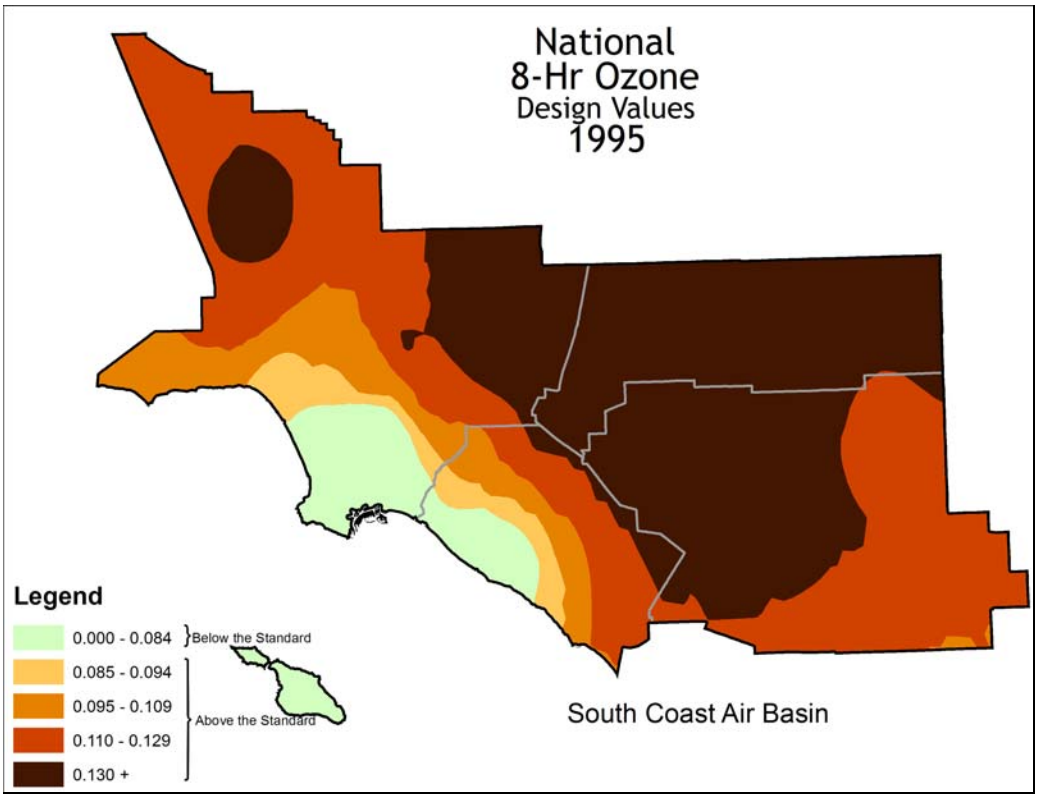
highest design values. In general, ozone trends show the greatest improvement in coastal areas like San Diego and Ventura.

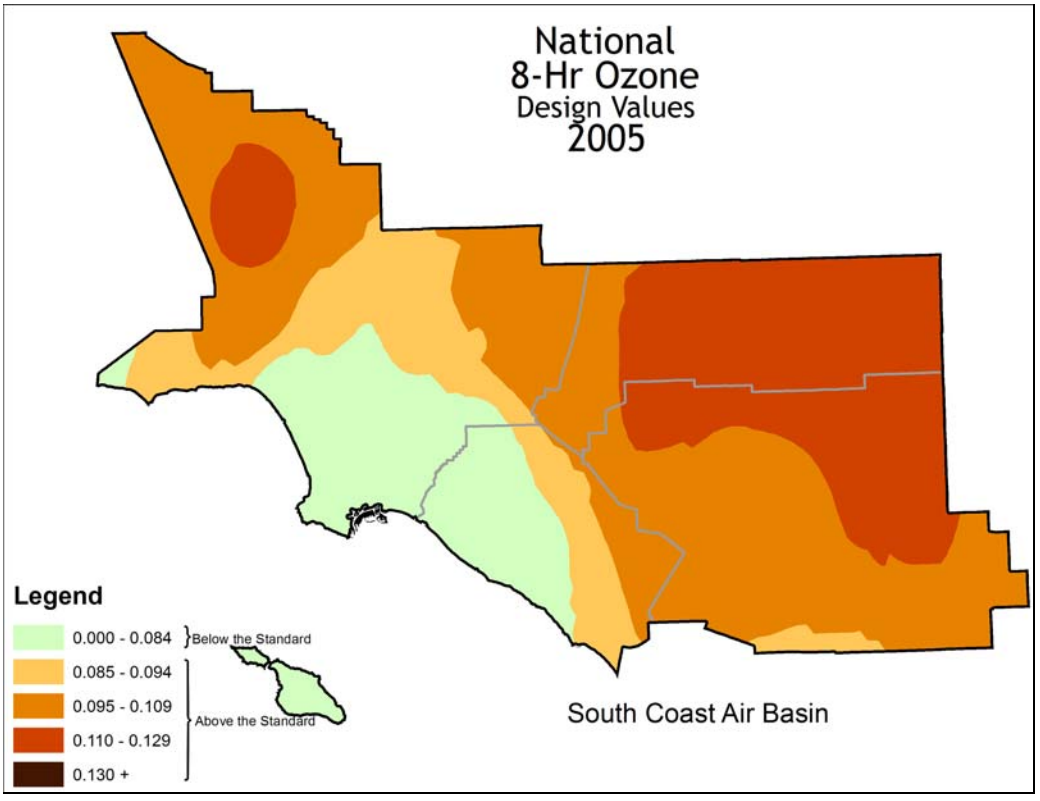




South Coast's ozone concentrations have been cut by about a third since 1990, but the region's design value is still 50 percent over the level of the standard and progress has slowed in recent years. Fifteen years ago, the highest values were widespread throughout the basin. Now, the number of communities within the basin experiencing the highest values is substantially smaller. The maps on Pages 11-12 show this progression of air quality progress.

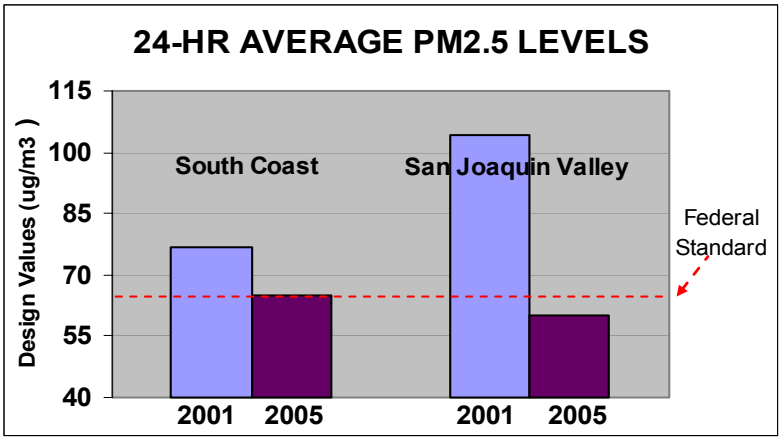
Ozone Air Quality Comparison – South Coast
1995 to 2005

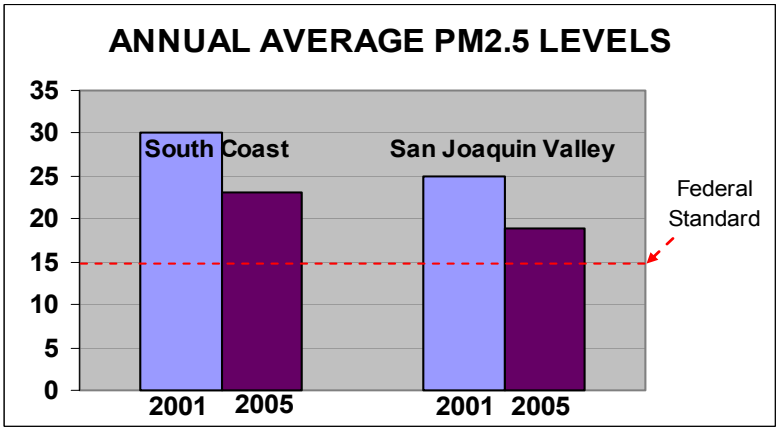




PM2.5 Trends

Both the South Coast and San Joaquin Valley are showing good progress toward PM2.5 attainment. As of 2005, both regions are meeting the 24-hour standard. In addition, annual average PM2.5 design values have declined by 25 percent since 2001. In terms of the remaining challenge, the South Coast levels are still about 50 percent above the standard, and the San Joaquin Valley levels are about 25 percent above the standard.





Development of State Strategy

In developing our proposed statewide emission reductions strategy, ARB staff worked closely with air districts on attainment demonstrations for ozone for each area and a PM2.5 attainment demonstration for the South Coast. In that process, emissions inventories are developed and air quality models are used to establish a region's "carrying capacity" and to calculate the additional emission reductions needed for attainment.

The emission reduction targets serve three purposes. First, they provide an indication of how far the existing control program will take each region toward attainment and if

additional reductions from new measures are needed. Second, they indicate how much time a region may need to reach the standards and if a classification change to a later attainment date is likely needed. And third, they provide a benchmark for designing new emission reduction measures.

The magnitude of the attainment challenges in the South Coast and San Joaquin Valley, as shown in the next chapter, are the drivers for ARB staff's proposed statewide strategy. The new SIP measures are also needed for the Sacramento region. California's other ozone nonattainment areas, including San Diego and Ventura, are projected to attain by their assigned deadline based on the benefits of previously adopted SIP measures.

Given the severity of the ozone problems in the South Coast and San Joaquin Valley, both regions will likely need to be classified as extreme (see discussion in regional summaries) with attainment deadlines of 2024. The PM2.5 deadline for both areas is 2015. This earlier deadline and the South Coast PM2.5 carrying capacity framed staff's analysis of new near-term measures. The other key driver for developing new SIP strategies is to reach ozone attainment in both regions as quickly as possible.

Chapter 2 will summarize the process of determining the emission reduction targets and show those targets for the South Coast and San Joaquin Valley. The process consists of developing an emissions inventory and performing data analyses and air quality modeling based on that inventory to establish the emissions limit that ensures air quality standards are met.

Air Pollution Transport

Air pollution transport, by definition is quite simple – air movements carry pollutants from one area to another. In reality, air pollution transport is a very complex phenomenon. It is three-dimensional and can occur at ground level or in upper air levels aloft. With modeling for the State being split into two modeling domains – one for Northern and Central California and one for Southern California, transport relationships between air districts within these large domains are implicitly captured within the models. This is the mechanism ARB uses in its oversight role to ensure transport impacts on downwind areas are addressed for purposes of both State and federal air quality standards. In terms of attainment demonstrations, inputs to the modeling for a downwind area include forecasted emission reductions in upwind areas. This way the attainment demonstration takes into account the shared responsibility for reducing emissions in regions where air pollution transport can at times be significant.

Other Programs

In addition to SIPs, ARB has multiple plans and programs to reduce air pollution throughout California. Emission reduction strategies from many of these programs are taken into account in the ozone and PM2.5 SIPs.

ARB Goods Movement Plan

The Emission Reduction Plan for Ports and Goods Movement in California, approved by ARB in April 2006, is one of the main contributors of new measures necessary to meet federal air quality standards. Most goods that move within and through California do so by truck. Ships are the largest source of SOx emissions in the State. Heavy-duty trucks are the largest statewide source of NOx emissions. These air pollution realities make it impossible to tackle the PM2.5 challenge without addressing goods movement emissions. Likewise, emission reduction targets for ozone will not be met without reducing emissions related to goods movement.

The strategies included in the goods movement emission reduction plan target ships and trucks, as well as the other three main sources of goods movement emissions: harbor craft, cargo handling equipment, and locomotives. By 2020, these strategies will cut statewide goods movement emissions of NOx by 63 percent, SOx emissions by 78 percent, and will also reduce the statewide health risk from goods movement-related diesel particulate matter 85 percent.

Work on many of the strategies in the goods movement emission reduction plan is underway and serves as the starting point for near-term actions to meet the emission reduction targets for the SIPs. These strategies will provide essential new emission reductions needed for regional attainment, while they reduce the air pollution-related health risk for those who live near our ports, railyards, distribution centers, and other goods movement facilities.

ARB Diesel Risk Reduction Plan

An important source of directly emitted PM2.5 is diesel exhaust. The particulate matter from diesel-fueled engines (diesel PM) has been singled out as a particularly harmful pollutant and identified as a toxic air contaminant by the Air Resources Board in 1998. Nearly 70 percent of the known cancer risk caused by air toxics is attributed to diesel PM. In 2000, ARB adopted a plan to reduce diesel PM emissions 85 percent by 2020, and has since adopted a number of regulatory measures to reduce diesel PM emissions statewide. Additional measures are under development. Diesel PM control measures in the plan are reducing both direct diesel PM and NOx emissions through a combination of engine retrofits and replacements. Upcoming mobile source fleet measures to reduce diesel PM and NOx emissions are a critical part of the new SIP strategy as well the Diesel Risk Reduction Plan.

Environmental Justice

The SIPs consist of strategies designed to bring a region's air quality into compliance with federal standards. SIPs must be designed to ensure air quality standards throughout the entire region, so achieving air quality standards provides public health benefits to every community. This makes SIP implementation important to meeting ARB's community health and environmental justice goals. As part of our environmental justice program, ARB has initiated air quality studies in several communities and continues to focus resources on mobile source enforcement in environmental justice

communities. ARB's Air Quality and Land Use Handbook, approved by ARB in May 2005, provides guidance to help improve local land use decisions that can negatively impact public health at the community level.

ARB's SIP strategies have a significant nexus to community health due to the emphasis on cleaning up the legacy fleets of diesel engines. Much of the large equipment and vehicles that help construct our buildings and highways and move our goods are not well controlled and have very long lives. Adopting rules to clean up these fleets will have an immediate and significant effect on the communities where these sources are concentrated.

Regional Haze

The same particulate air pollutants that affect public health also extinguish and scatter light, thereby obscuring visibility. The federal Clean Air Act set the far-reaching goal of achieving natural visibility conditions by 2064 in the nation's most treasured parks and wilderness areas. Of the 156 designated areas, 29 are in California, managed by the National Park Service and the U.S. Forest Service. Therefore California is working in concert with fourteen other western states to reduce controllable emissions of particulates so that regional haze is reduced in the western region of the country. In 1999, the U.S. Environmental Protection Agency published rules to guide the preparation of Regional Haze State Implementation Plans to reduce regional haze.

ARB is currently preparing the first regional haze plan for the entire State, for transmittal to EPA by the December 17, 2007 deadline. General trends in California since the 1990s show that emission controls are improving visibility in our parks and wilderness areas. The regional haze plan will show how these controls constitute reasonable progress along the path to natural visibility. In 2012, ARB will conduct a mid-course review of measured visibility changes and analyze how emission reductions implemented to achieve the 8-hour ozone and the PM2.5 standards will move the State further along the path to natural visibility in the future.

Climate Change

ARB's implementation of the Global Warming Solutions Act of 2006 (AB 32) is a major new effort just underway. These activities, including future rulemaking, will occur on a parallel but separate track as we proceed with implementation of our SIP strategies. The statutory requirements and timelines are different, so it is not appropriate to include potential co-benefits of greenhouse gas strategies in SIP documents at this point. However, as greenhouse gas reduction measures are developed and adopted, ARB staff will do the necessary technical work to determine the impact on ozone and PM2.5 precursor pollutants.

2. TECHNICAL FOUNDATION

Emissions Inventory Overview

Developing attainment strategies requires an understanding of the sources of the pollution, the quantities emitted, and how air pollution controls and growth will impact future emission levels. There are multiple types of emission inventories used in air quality programs including annual averages, seasonal, and day-specific modeling inventories. SIPs rely on region specific inventories that may differ from the statewide picture. In the regulatory development process emission inventories are typically refined since inventory data is a key input for cost-effectiveness evaluations. This is an important inventory improvement mechanism, and ARB staff incorporates these updates into the statewide inventory.

The emissions inventory serves three principle roles in the SIP process:

- It provides a primary input to the modeling necessary to determine the emission reductions needed for attainment;
- It supplies comprehensive emissions information for the development of emission reduction strategies;
- And after the SIP is approved, it is used to track progress of the emission reduction commitments outlined in the plan.

California is a diverse State with many sources of air pollution. ARB, in cooperation with local air districts, maintains a statewide emissions inventory. The inventory is constructed based on four major emission categories:

- Stationary Sources -- generally industrial facilities, which can be identified by a name and location.
- Areawide Sources -- either small individual sources, such as residential fireplaces, or widely distributed sources that cannot be tied to a single location, such as consumer products and dust from unpaved roads.
- On-Road Mobile Sources -- includes on-road cars, trucks, buses, etc.
- Off-Road Mobile Sources -- includes off-road vehicles such as boats, off-road recreational vehicles, aircraft, trains, ships, industrial and construction equipment, farm equipment, and other equipment.

The statewide emissions inventory developed by ARB and the local air districts includes all the main sources of emissions – all of the many on-road and off-road mobile sources and all the various stationary and areawide sources. Estimating the amount of emissions statewide and in each region is done by summing the emissions from each source. The statewide inventory for the 2007 SIP development uses ARB's November 2006 on-road motor vehicle model (EMFAC) and ARB's off-road mobile source model. Stationary source emissions are provided by local air districts. The regional SIP inventories are discussed in Chapter 5, Regional SIP Summaries.

Precursor Pollutants

Air pollutants that react to form ozone and PM2.5 in the air are called precursor pollutants. For ozone, the main precursor pollutants are nitrogen oxides (NOx) and reactive organic gases (ROG). There are four main precursors of PM2.5: NOx, ROG, sulfur oxides (SOx) and ammonia (NH3). PM2.5 can also be directly emitted into the atmosphere (direct PM2.5) in various forms that include smoke from fires, dust from paved and unpaved roads, and particle emissions from the burning of fossil fuels.

PM2.5 pollution is a complex mixture and air quality modeling is used to assess the relative effectiveness of reducing each precursor pollutant as well as directly emitted PM2.5. Current data analysis and air quality modeling indicates that two of the four precursors, NOx and SOx, are significant in reducing PM2.5 concentrations in the South Coast, and that the emission control strategy would be served best by focusing on reducing emissions of these two precursor pollutants. There is also a small PM2.5 benefit from ROG emission reductions, but benefits from ammonia emission reductions were found to be insignificant. Reducing direct PM2.5 is also an effective strategy according to recent modeling.

NOx. Nitrogen oxide emissions are produced by the combustion of fuels in engines, furnaces, or fires. Today mobile sources make up about 85 percent of the total statewide NOx emissions. This percentage decreases over time as motor vehicle fleets become cleaner. Categories like locomotives, ships, and aircraft continue to grow. Stationary sources of NOx include combustion processes in industries such as manufacturing, food processing, electric utilities, and petroleum refining. Areawide sources of NOx, which include waste burning and residential fuel combustion, contribute a smaller portion of total NOx emissions.

ROG. Reactive organic gases result primarily from incomplete fuel combustion and the evaporation of chemical solvents and fuels. Stationary sources of ROG include processes that use solvents such as dry cleaning, degreasing, and coating operations. Today mobile sources are the largest ROG emissions category. However, other ROG categories become relatively more important over time. Areawide ROG sources which grow directly with population begin to dominate in the future so that by 2020 consumer products is the largest source category.

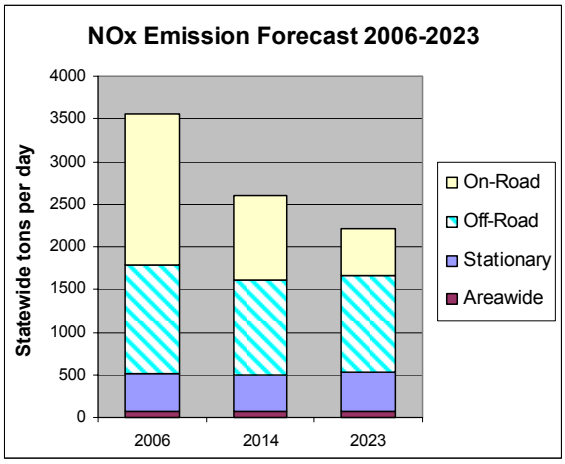
SOx. Sulfur oxide emissions are dominated by the mobile source category of ships and commercial boats. Evaporative losses from petroleum refining (a stationary source) are another significant source of SOx. The other sources that make up 5 percent or more of the SOx inventory are locomotives and mining and cement manufacturing.

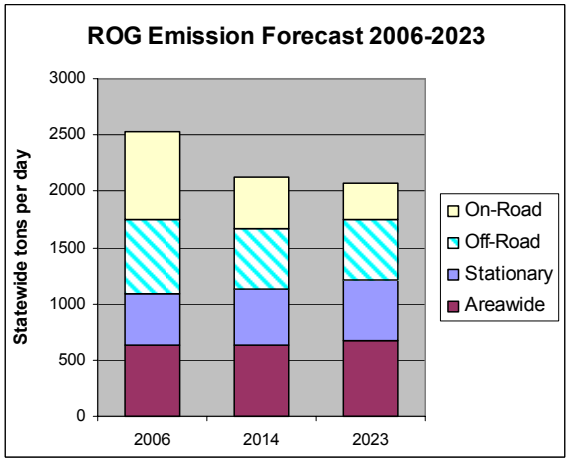
Direct PM2.5. Directly emitted PM2.5 comes mainly in the form of smoke, soot, and dust particles. Major sources include managed burning and agricultural burning; dust generated by vehicles traveling on paved and unpaved roads, residential fireplaces, cooking and fuel combustion; and particle emissions from diesel-fueled engines on trucks, ships, and construction equipment. While soot from diesel engines is not a major portion of the entire direct PM2.5 emissions inventory, it is a major health concern, as it is a toxic air contaminant that can cause premature death.

Forecasting Future Emissions

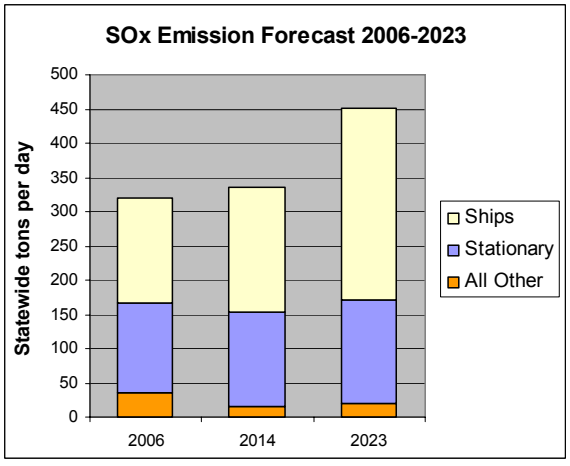
Estimates of projected future emissions depend on two independent variables: growth and control. Different methods are used to estimate the future growth of emission sources based on their type. And future emission controls are incorporated into the projected emissions for each source category based on when the controls are implemented, how much the controls reduce emissions, and how many units (vehicles, consumer products, etc.) are affected.

The charts on the next page show the change in total projected statewide emissions for NOx, ROG, and SOx from 2006 to 2023 and the relative emissions change in each of these emission source categories. It reflects projected growth in each category combined with the benefits of the existing control program (those emission controls adopted prior to 2007). For example, SOx emissions as a category continue to grow due to ship emission increases. This makes ship SOx emissions a high priority for control in the new SIP strategy. NOx and ROG emissions are decreasing as a result of existing control programs despite substantial growth in population, travel, and the economy.





Note: "Off-Road" includes trains, planes, and ships, as well as all other off-road vehicles and equipment.



Top Emission Sources

While the top emission categories are mobile sources in all California's nonattainment areas, there is variability in the relative contribution of different sources by region. This makes the overall statewide emission reduction strategy more challenging and will affect the priorities of local control plans. For example, controlling the emissions from ocean-going vessels will have a tremendous impact on SOx emissions in the South Coast and therefore is essential to that region's PM2.5 control plan. Reducing SOx from ships has much less consequence in the San Joaquin Valley, so increased NOx reductions from combustion sources will become even more important for the Valley's PM2.5 control strategy. The tables on the next two pages show the top emission sources of both NOx and ROG in the South Coast and the San Joaquin Valley.

Here are some things we have learned by analyzing the emissions inventory for these two areas:

- South Coast NOx emissions are significantly impacted by goods movement, with the ships, trains, trucks, and off-road equipment that move goods contributing about 30 percent of all South Coast NOx emissions. Aircraft NOx emissions are also increasing.

- The impact of goods movement in the San Joaquin Valley is felt mostly by the emissions contribution of heavy-duty trucks, which are projected to remain the largest NOx emitter through 2023.

- Emissions of NOx from manufacturing and industrial sources in the San Joaquin Valley become increasingly significant as emissions from mobile sources decline in the future.

- The large population in the South Coast is the main reason why consumer product emissions are projected to become the number one ROG emissions source by 2014.

- San Joaquin Valley ROG emissions are significantly impacted by agricultural sources such as livestock waste.

- The existing emission control program will cut heavy-duty truck NOx emissions about 70 percent in the San Joaquin Valley and South Coast by 2023, but they need to be cut even more by new strategies to attain ozone and PM2.5 standards.

- Mobile sources under federal jurisdiction (like ships, locomotives, and aircraft) contribute an increasingly greater proportion of total emissions, especially NOx, in future years as emission increases due to growth overwhelm the existing control program, while emissions of mobile sources under State jurisdiction decrease due to stringent controls.

South Coast Air Basin – Top Sources of NOx

Summer emissions, tons per day

Source Category	2006	2015	2020
HEAVY DUTY DIESEL TRUCKS	259	129	87
PASSENGER VEHICLES	205	94	65
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	120	75	51
OFF-ROAD EQUIPMENT (COMMERCIAL, INDUSTRIAL)	87	49	38
SHIPS AND COMMERCIAL BOATS	75	89	104
GASOLINE-FUELED COMMERCIAL TRUCKS	36	23	19
LOCOMOTIVES	31	23	26
RESIDENTIAL FUEL COMBUSTION	18	14	14
MANUFACTURING & INDUSTRIAL (BOILERS, ENGINES)	17	15	15
SERVICE AND COMMERCIAL (BOILERS, ENGINES)	16	11	11
RECREATIONAL BOATS	16	17	18
AIRCRAFT	16	23	27
TOTAL OF TOP CATEGORIES	**896**	**562**	**475**
TOTAL	**972**	**622**	**530**
TOP CATEGORIES PERCENT OF TOTAL	**92%**	**90%**	**90%**

South Coast Air Basin NOx total for 2014 is 650 tons per day.

San Joaquin Valley – Top Sources of NOx

Summer emissions, tons per day

Source Category	2006	2015	2023
HEAVY DUTY DIESEL TRUCKS	285	141	75
FARM EQUIPMENT (COMBINES AND TRACTORS)	60	34	17
PASSENGER VEHICLES	58	28	16
MANUFACTURING & INDUSTRIAL (BOILERS, ENGINES)	39	44	48
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	35	20	12
OFF-ROAD EQUIPMENT (COMMERCIAL, INDUSTRIAL)	34	21	15
LOCOMOTIVES	22	21	22
AGRICULTURAL IRRIGATION PUMPS	16	5	5
OIL AND GAS PRODUCTION (COMBUSTION)	11	10	10
COGENERATION (ELECTRICITY GENERATION AND HEAT RECOVERY)	9	8	8
GASOLINE-FUELED COMMERCIAL TRUCKS	9	7	6
FOOD AND AGRICULTURE (CROP PROCESSING AND WINERIES)	9	9	9
GLASS AND RELATED PRODUCTS	8	9	11
TOTAL OF TOP CATEGORIES	**596**	**357**	**254**
TOTAL	**650**	**404**	**300**
TOP CATEGORIES PERCENT OF TOTAL	**92%**	**88%**	**85%**

San Joaquin Valley NOx total for 2014 is 426 tons per day.

Note: Emissions do not include impact of State Strategy proposed new measures.

South Coast Air Basin – Top Sources of ROG

Summer emissions, tons per day

Source Category	2006	2015	2020
PASSENGER VEHICLES	207	107	85
CONSUMER PRODUCTS	101	103	107
RECREATIONAL BOATS	64	52	50
OFF-ROAD EQUIPMENT (LAWN AND GARDEN)	52	40	38
ARCHITECTURAL COATINGS (PAINTS AND THINNERS)	31	29	30
OFF-ROAD EQUIPMENT (COMMERCIAL, INDUSTRIAL)	28	14	12
PETROLEUM MARKETING (GASOLINE EVAPORATIVE LOSSES)	27	28	30
COATINGS (PAINTS AND THINNERS - NON ARCHITECTURAL)	27	26	27
GASOLINE-FUELED COMMERCIAL TRUCKS	24	12	10
GAS CANS	21	10	8
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	20	12	9
TOTAL OF TOP CATEGORIES	**602**	**433**	**406**
TOTAL	**732**	**559**	**537**
TOP CATEGORIES PERCENT OF TOTAL	**82%**	**77%**	**76%**

South Coast Air Basin ROG total for 2014 is 567 tons per day.

San Joaquin Valley – Top Sources of ROG

Summer emissions, tons per day

Source Category	2006	2015	2023
PASSENGER VEHICLES	62	35	24
WASTE DISPOSAL/COMPOSTING	57	71	80
LIVESTOCK WASTE (DAIRY CATTLE)	40	33	41
OIL AND GAS PRODUCTION (EVAPORATIVE LOSSES/FLARING)	28	25	23
CONSUMER PRODUCTS	24	26	30
PESTICIDES	23	21	21
HEAVY DUTY DIESEL TRUCKS	20	12	8
RECREATIONAL BOATS	20	17	17
FOOD AND AGRICULTURE (CROP PROCESSING AND WINERIES)	13	12	13
ARCHITECTURAL COATINGS (PAINTS AND THINNERS)	11	12	13
OFF-ROAD EQUIPMENT (COMMERCIAL, INDUSTRIAL)	10	5	4
FARM EQUIPMENT (COMBINES AND TRACTORS)	10	5	3
TOTAL OF TOP CATEGORIES	**318**	**274**	**277**
TOTAL	**452**	**406**	**414**
TOP CATEGORIES PERCENT OF TOTAL	**70%**	**67%**	**67%**

San Joaquin Valley ROG total for 2014 is 410 tons per day.

Note: Emissions do not include impact of State Strategy proposed new measures.

Linking Emissions to PM2.5 Levels

Assessing how emissions affect PM2.5 concentrations is more complicated for PM2.5 than it is for ozone. While ozone has just two key precursors, PM2.5 is a complicated mix of particles, some formed in the atmosphere and some directly emitted. PM2.5 can be directly emitted into the air in forms such as dust and soot. PM2.5 is also formed in the atmosphere from the reaction of the precursor gases -- NOx, SOx, ROG, and ammonia. This is called secondary PM2.5.

The main contributors of direct PM2.5 are organic and elemental carbon, emitted from sources like residential wood burning, agricultural burning, and particles emitted from gas and diesel engines. A smaller fraction of organic carbon is secondary PM2.5, formed from organic gases (ROG) evaporated into the air. Dust is also a source of direct PM2.5, but most dust is made up of coarse particles larger than 2.5 microns in diameter, and so dust is a much bigger contributor to the PM10 inventory than the PM2.5 inventory.

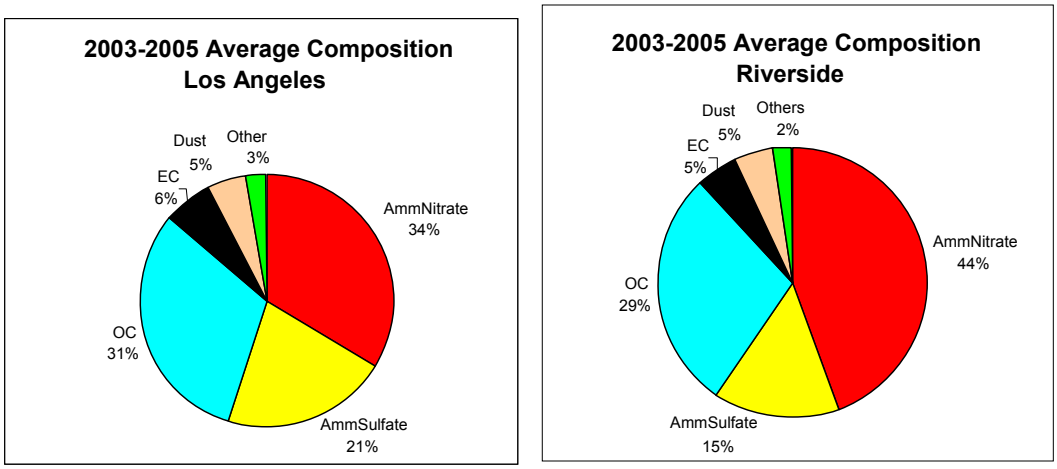
The two main contributors of secondary PM2.5 are ammonium nitrate and ammonium sulfate particles. The main precursor of ammonium sulfate is SOx. The chief precursor of ammonium nitrate is NOx. ROG plays a lesser precursor role in the forming of both these secondary PM2.5 compounds. Mobile sources are the main emitters of these three precursor gases, with ships dominating SOx emissions, and cars, trucks and off-road equipment contributing the largest portion of NOx and ROG emissions.

Use of special monitoring and modeling tools are needed to establish which sources and how much of their emissions contribute to PM2.5 levels in a specific area. The charts on the next page show the PM2.5 source contribution measured in two areas of the South Coast air basin and two areas of the San Joaquin Valley air basin. There are several major differences in the PM2.5 contribution between the two air basins. First, there is a higher concentration of ammonium sulfate in the South Coast due to its higher SOx emissions. And second, organic carbon contributes a higher portion of PM2.5 in the San Joaquin Valley.

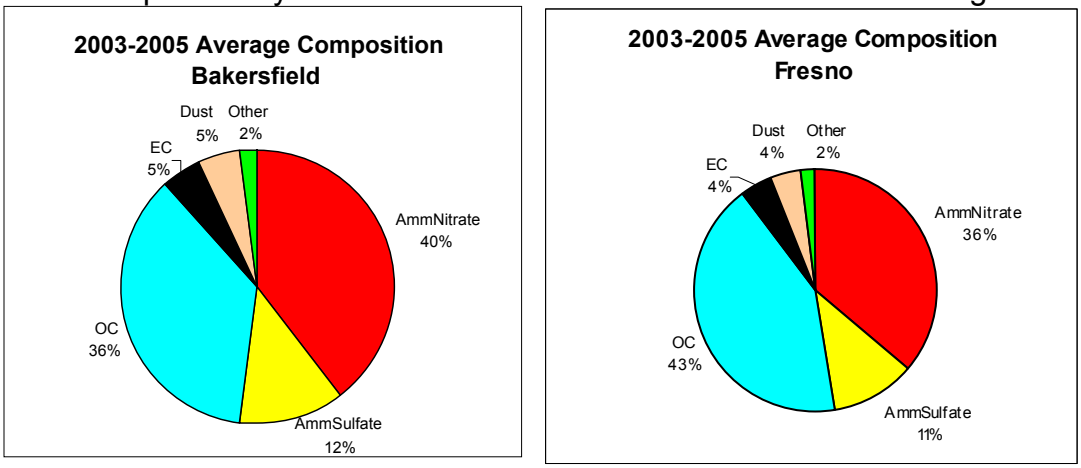
Within the air basins, there are also some major differences. In the South Coast, there is more ammonium sulfate in Los Angeles and more ammonium nitrate in Riverside. The larger amounts of ammonium sulfate in Los Angeles are likely due to SOx emissions from ships at the coastal ports, while the Riverside site receives an accumulation of NOx from on- and off-road vehicles and equipment and other sources, causing a higher concentration of ammonium nitrate.

In the San Joaquin Valley, Fresno has a higher concentration of organic carbon and less ammonium nitrate than Bakersfield. A 2000 particulate matter study showed that the difference may be due to the organic carbon from wood smoke in Fresno. The San Joaquin Valley has since adopted rules restricting residential wood burning. Because the PM2.5 problem can have regional as well as localized components, strategies that focus on the major contributors of PM2.5 in specific areas of an air basin may play an important role in meeting the federal standards.

South Coast – Source Contributions at Two Monitoring Sites



San Joaquin Valley – Source Contributions at Two PM2.5 Monitoring Sites



Setting the Emission Reduction Targets

To set ozone emission reduction targets, air quality modeling has been conducted separately for two overarching areas. One area is Northern and Central California, encompassing the San Joaquin and Sacramento Valleys, the Bay Area and the Sierra Nevada Mountains. ARB staff has been doing this modeling. The other area is Southern California, including the South Coast Air Basin, Ventura County, Imperial County, and the Mojave Desert area. The South Coast air district has been doing this modeling.

The South Coast air district has been performing the air quality modeling to set its PM2.5 target.

South Coast Ozone Emission Reduction Targets

South Coast released a draft plan with estimated ozone carrying capacities in October 2006. Since then the District has been refining the inputs to their air quality modeling.

They expect to release an update to their plan, with refined carrying capacities, after this draft of the State Strategy is released.

For ozone the draft modeling and the refined modeling underway both indicate similar large emission reduction targets for NOx and ROG. It appears from the modeling that NOx reductions are more effective at reducing ozone in the long run, although ROG reductions are still needed to maximize progress. ARB has relied on the draft carrying capacities established by the South Coast air district to develop the measures in this SIP. The targets based on the draft carrying capacities are presented below.

Draft South Coast Ozone Emission Reduction Targets

(tons per day)	NOx	ROG
2006 Emissions Inventory	972	732
Carrying Capacity	238	304
Emission Reduction Target	**734**	**428**

ARB staff expects that the South Coast will call for more NOx reductions and fewer ROG reductions in the upcoming plan release. This is because the modeling shows that NOx reductions look to be more effective than ROG reductions. It may be appropriate for the District to change the emphasis now, but the relative carrying capacities will need to be revisited in subsequent SIPs to factor in inventory improvement, updated modeling, and control measure development.

South Coast PM2.5 Emission Reduction Targets

As discussed previously, unlike ozone, PM2.5 consists of many different components. These components can vary by location and season, with both local and regional scale contributions. This complexity and variability presents a unique challenge in modeling for attaining the annual standard, and introduces a higher level of uncertainty in the results. In addition, while there is a long history and body of experience for ozone model application, air quality modeling for PM2.5 is relatively more recent, and it has not been applied as extensively. ARB will continue to work with air districts on efforts to refine PM2.5 modeling techniques.

As with ozone, the South Coast included PM2.5 carrying capacities in their October 2006 draft plan and has since been refining them. Based on the draft carrying capacities the PM2.5 reductions targets are presented here.

Draft South Coast PM2.5 Emission Reduction Targets

(tons per day)	NOx	ROG	SOx	Direct PM2.5
2006 Emissions Inventory	972	732	63	100
Carrying Capacity	421	457	19	84
Emission Reduction Target	**551**	**275**	**44**	**16**

San Joaquin Valley Emission Reduction Targets

ARB staff has been using photochemical models for Northern and Central California developed as part of the multi-million dollar Central California Air Quality Study. This modeling continues to confirm that NOx is the key to long term attainment in the San Joaquin Valley. (This is also true for the Sacramento valley and the rural regions downwind.) ROG looks beneficial especially in the near term for maximum progress and to supplement NOx reduction long term.

The ozone emission reduction targets for San Joaquin Valley are shown in the following table. The ROG carrying capacity is implicit, based on the much larger benefit of NOx reductions demonstrated by the modeling.

San Joaquin Valley Ozone Emission Reduction Targets

(tons per day)	NOx	ROG
2006 Emissions Inventory	650	452
Carrying Capacity	160	345
Emission Reduction Target	**490**	**107**

San Joaquin Valley PM2.5 modeling is underway and carrying capacities and emission reduction targets will be developed later in 2007 for a PM2.5 plan that is due to U.S. EPA in April 2008.

3. ARB's 2007 SIP STATE STRATEGY

The State Strategy maps out how to achieve the emission reductions necessary to meet the federal air quality standards. The two main emission reduction components of the State Strategy are the adopted SIP measures and proposed new measures. The adopted SIP measures include those adopted through 2006. Proposed new measures include those to be adopted after 2006.

Responsibility for implementing emission reduction measures is shared between the agencies with primary responsibility for controlling air pollution in California: the Air Resources Board, 35 local air pollution control and air quality management districts, and the U.S. Environmental Protection Agency. However, given the current status of statewide emissions, ARB has the lion's share of responsibility, followed by U.S. EPA. There are very few remaining measures to be carried out at the local level.

Agency Roles in SIP Measure Development

Local Measures

Local air districts are primarily responsible for controlling emissions from stationary and areawide sources (with the exception of consumer products) through rules and

permitting programs. Examples include industrial sources like factories, refineries, and power plants; commercial sources like gas stations, dry cleaners, and paint spray booth operations; residential sources like fireplaces, water heaters, and house paints; and miscellaneous non-mobile sources like emergency generators. Districts also inspect and test fuel vapor recovery systems to check that such systems are operating as certified.

State Measures

ARB is responsible for controlling emissions from mobile sources (except where federal law preempts ARB's authority) and consumer products, developing fuel specifications, establishing gasoline vapor recovery standards and certifying vapor recovery systems, providing technical support to the districts, and overseeing local district compliance with State and federal law. The Department of Pesticide Regulation is responsible for control of agricultural, commercial and structural pesticides, while the Bureau of Automotive Repair runs the State's Smog Check programs to identify and repair polluting cars.

Federal Measures

U.S. EPA has the authority to control emissions from mobile sources, including sources all or partly under exclusive federal jurisdiction (like interstate trucks, some farm and construction equipment, aircraft, marine vessels, and locomotives based in this country). U.S. EPA also has oversight authority for state air programs as they relate to the federal Clean Air Act. International organizations develop standards for aircraft and marine vessels that operate outside the U.S. Federal agencies have the lead role in representing the U.S. in the process of developing international standards.

Impact of Adopted SIP Measures

Many measures already adopted by local, State and federal agencies are currently reducing emissions. Many will do so at an accelerated rate in the future. Some adopted measures are scheduled to go into effect years hence. Adopted SIP measures will have a very significant impact on emissions and air quality between now and the target dates (attainment years) in the areas of the State that do not meet federal ozone and PM2.5 air quality standards.

Adopted SIP measures have been developed over the years through the combined efforts of air pollution regulators – with a foundation of ARB's mobile source and fuels programs, complementary national actions for pollution sources under federal authority, and local air district programs for industrial and commercial sources -- as well as transportation plans that integrate transit and other alternatives to solo vehicle travel. ARB has adopted 46 emission-reducing control measures since the approval of the 1994 1-hour ozone SIP. These measures, shown on the table titled "Air Resources Board SIP Control Measures (1994-2006)", comprise the bulk of the benefits of the adopted measures. We've summarized the highlights below.

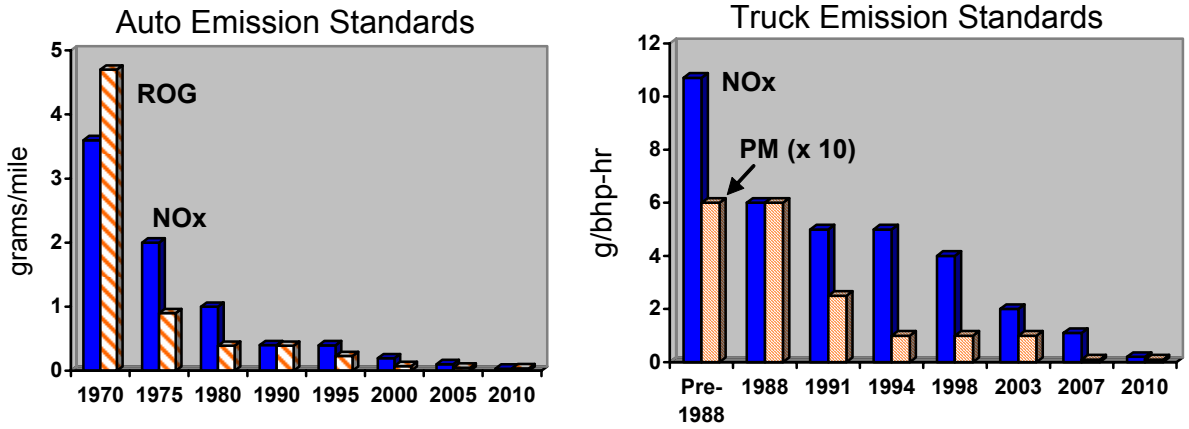
Mobile Sources

Cleaner Engines and Fuels

More than any other pollution control effort, ARB's mobile source program has moved the State's nonattainment areas closer to meeting federal air quality standards. The mobile sector continues to be the heart of the attainment effort with a new focus on vehicles and equipment already in use – the "legacy" or in-use fleet. California has dramatically tightened emission standards for on-road and off-road mobile sources and the fuels that power them. The chart below and the table on the next page show how dramatically the adopted measures have controlled emissions from new engines for the major categories of mobile sources.

California has led the way in adopting stringent regulations for passenger vehicles. Compared to uncontrolled vehicles, cars are now 99 percent cleaner. A new 1965 car produced about 2,000 pounds of ozone-forming ROG emissions during 100,000 miles of driving. California's low-emission standards, coupled with reformulated gasoline, have cut that to less than 50 pounds for the average new car today. By 2010, California's standards will further reduce ROG emissions from the average new 2010 car to approximately 10 pounds.

ARB's first diesel engine regulations went into effect in 1988. Significant gains began with the introduction of California Clean Diesel fuel in 1993. U.S. EPA and ARB worked together to develop and adopt the next phases of on-road diesel engine control, with cleaner fuel in 2006 and even cleaner engines in 2007 that will reduce per-truck particulate matter emissions by another 90 percent. By 2010, new trucks will be 98 percent cleaner than new pre-1988 models, providing needed NOx reductions.



Working in concert with the U.S. EPA, standards for goods movement sources have also been cut dramatically. By requiring low-sulfur fuel, SOx emissions from ship auxiliary engines will be cut 96 percent by 2010. New locomotive engines are now 50-60 percent cleaner. Harbor craft emission standards were cut roughly in half. And new cargo handling equipment will be 95 percent cleaner by 2011.

Impact of Existing Standards and Emission Limits

Source	Controlled Since	Level of Control*
ON-ROAD		
Passenger Cars	1966	**99% in 2006 (ROG + NOx)**
Trucks and Buses	1988	**90% by 2007, 98% by 2010 (NOx)** **98% by 2007 (PM)**
Motorcycles	1975	**88% by 2008 (ROG + NOx)**
GOODS MOVEMENT		
Ship Auxiliary Engines (fuel)	2000	**96% (SOx), 83% (PM) by 2010**
Locomotives	1973	**60% in 2005 (ROG+NOx)**
Harbor Craft		**50% in 2004 (NOx)**
Cargo Handling Equipment		**95% by 2011-2012 (ROG+NOx, PM)**
OFF-ROAD SOURCES		
Large Off-Road Equipment	1996	**98% by 2015 (ROG + NOx)**
Personal Water Craft	1990	**88% by 2010 (ROG)**
Recreational Boats	1990	**89% by 2010 (ROG)**
Lawn & Garden Equipment	1990	**82-90% by 2010 (ROG)**
AREAWIDE SOURCES		
Consumer Products	1989	**50 categories controlled 50% (ROG)**

* Level of emissions control compared to uncontrolled source.

California has also drastically lowered standards for off-road sources, from lawn and garden equipment, to recreational vehicles and boats, to construction equipment and other large off-road sources. From 2010 through 2014, these new off-road sources will be manufactured with 80-98 percent fewer emissions than their uncontrolled counterparts.

ARB has worked closely with U.S. EPA to regulate large diesel, gasoline and liquid petroleum gas equipment – where authority is split between California and the federal government – and by 2014, new large off-road equipment will be 98 percent cleaner. ARB has also made great strides in reducing emissions from the smaller engines under State control, from lawn and garden equipment, to recreational vehicles and boats. From 2010 to 2015, these new off-road sources will be manufactured with 82-90 percent fewer emissions than their uncontrolled counterparts

Cleaning Up the In-Use Fleet

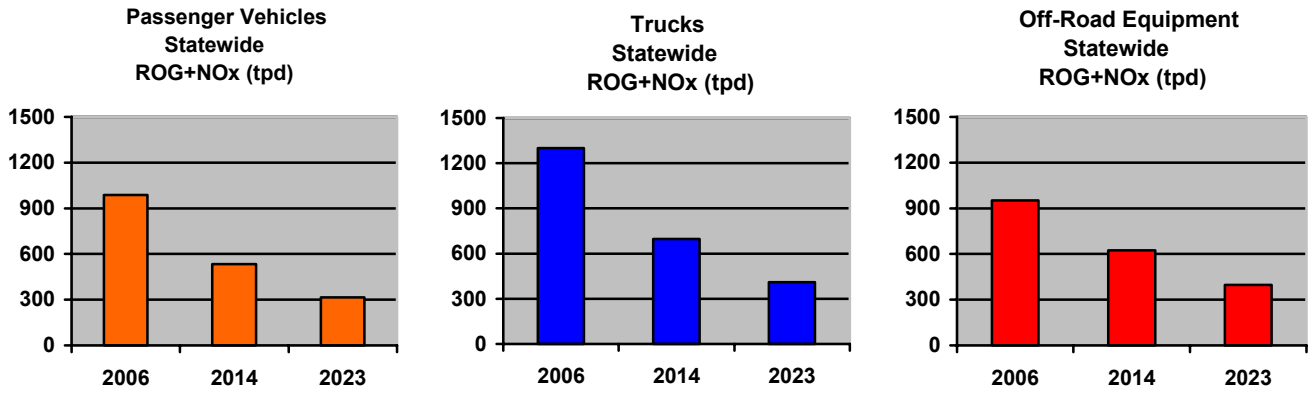
As new engines have become cleaner, the emissions contribution from older vehicles has been growing to the extent that it will soon make up the majority of mobile source emissions. Thus California's emission control program has also had to focus on cleaning up those vehicles and equipment already in use – the "in-use fleet." The adopted measures have made significant strides in reducing emissions from those mobile sources already in use by keeping existing vehicles cleaner longer, getting cleaner technology on older vehicles and equipment, and replacing older dirtier vehicles

and equipment with cleaner ones. Whereas new engine emissions have been regulated for a long time, most of the in-use control programs have just begun to evolve and have an impact. We still have a lot of work to do to clean up the in-use fleet. That is why the majority of new measures in the State Strategy are in-use measures.

Many programs and rules are currently in place that reduce emissions from the in-use fleet. California's Smog Check Program is the cornerstone of the passenger vehicle in-use strategy, keeping over 400 tons of smog-forming gases from entering the air statewide each day. Passenger vehicles are also required to have software incorporated into their on-board computers to detect emission control system malfunctions as they occur. ARB's heavy-duty vehicle inspection program and periodic smoke inspection program reduce emissions from the in-use truck fleet. Trucks will also be required to have the same emission control malfunction detection software as passenger vehicles beginning in 2013.

ARB has adopted 20 in-use regulations in the last five years. In-use regulations have required use of cleaner fuels, greatly reducing emissions from ships and harbor craft. Excessive truck and bus idling has been restricted. ARB has adopted public and private fleet rules that require local governments and private companies to incorporate the cleanest vehicles and equipment into their fleets. In-use testing procedures and verification requirements for in-use emission control technology have been strengthened. And other operational and emission control technology requirements that help reduce emissions from existing vehicle and equipment have been put into place.

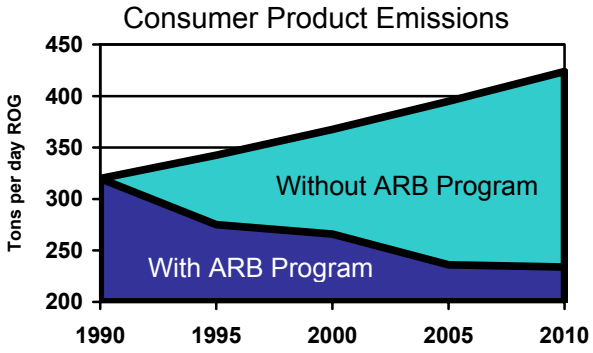
Incentive programs have worked hand-in-hand with in-use regulations, providing added emissions benefits. California is currently investing up to $140 million per year to clean up older, higher-emitting sources through the Carl Moyer Program. The Smog Check Breathe Easier Campaign pays motorists $1,000 to permanently retire their high-polluting vehicles. And local governments use special vehicle registration fees to fund projects that further reduce emissions from motor vehicles.



The charts above clearly illustrate the benefits of adopted SIP measures to reduce emissions from mobile sources. The progress has been dramatic. But because on-road and off-road mobile sources together account for so much of the State's inventory of ozone

and PM2.5 forming emissions, further reductions in mobile source emissions are essential if air quality standards are to be realized.

Consumer Products



ARB has adopted standards to limit emissions from nearly 50 consumer product categories (such as hair sprays, deodorants, and cleaning compounds), as well as over 35 architectural coatings and aerosol paints categories. The Board has adopted and implemented voluntary provisions to offer greater compliance flexibility to consumer product manufacturers while retaining the air quality benefits. Without these actions, ROG emissions from these products would be roughly 60 percent greater in 2010. But, as you can see from the above chart, the impact of population growth begins to counter the benefits of adopted measures – more controls are needed.

Air Resources Board SIP Control Measures (1994-2006)

Air Resources Board Action	Date	Air Resources Board Action	Date
In-Use Diesel Agricultural Engine Requirements	2006	California ZEV Requirement Update	2003
Consumer Product Lower Emission Limits	2006	Heavy-Duty Gas Truck Emission Standards	2002
Zero Emission Bus Rule Amendments	2006	Heavy-Duty Diesel Truck Emission Standards	2001
Off-Highway Recreational Vehicle Regulation Amendments	2006	Inboard and Sterndrive Marine Engine Emission Standards	2001
Forklifts and Other Spark-Ignition Equipment Regulation	2006	Architectural Coatings Suggested Control Measure	2000
Border Truck Inspection Program Protocol Improvements	2006	Urban Transit Bus Fleet Rule	2000
Ship Auxiliary Engine Cleaner Fuel Requirements	2005	Off-Road Diesel Equipment Emission Standards	2000
Diesel Cargo Handling Equipment Rule	2005	Reformulated Gas MTBE Phase Out	1999
Public and Utility Diesel Truck Fleet Rule	2005	Consumer Product Emission Limits	1999
Heavy-Duty Sleeper Truck Idling Limits	2005	Portable Fuel Can Regulation	1999
Portable Fuel Container Requirements	2005	Marine Pleasurecraft Emission Standards	1998
Transit Bus Rule Additions		Low-Emission Vehicle Program (LEV II) Exhaust Emission Standards	1998
Off-Road Diesel Engine Tier 4 Standards	2004	Large Off-Road Gas/LPG Engine Emission Standards	1998
Harbor Craft and Locomotive Clean Diesel Fuel Requirement	2004	Cleaner Burning Gasoline Rule Improvements	1998
Idling Limits for Trucks	2004	On-Road Heavy-Duty Truck Exhaust Emission Standards	1998
Consumer Products Rule	2004	Light-Duty Vehicle Off-Cycle Emission Controls	1997
Chip Reflash Program to Detect Truck Emission Control System Malfunctions	2004	Consumer Product Emission Limits	1997
Transportation Refrigeration Unit Rule	2004	Locomotive Memorandum of Agreement for the South Coast	1997
Portable Diesel Engine Emission Standards	2004	Medium- and Heavy-Duty Gas Truck Emission Standards	1995
Stationary Diesel Engine Regulation	2004	Aerosol Coatings Regulation	1995
Solid Waste Collection Vehicle Regulation	2003	Large Off-Road Diesel Statement of Principles	1996
Lawn and Garden Equipment Emission Standards	2003	Medium- and Heavy-Duty Gasoline Trucks	1995
Low Sulfur Diesel Fuel Regulation	2003	Off-Road Recreational Vehicles	1994

Local Rules and Programs

Stationary and Area Sources

Local air districts are primarily responsible for controlling emissions from stationary and areawide sources, with the exception of consumer products, through regulations and permits. Stationary sources include industrial sources like factories and power plants, commercial sources like gas stations and dry cleaners, and residential sources such as fireplaces and water heaters. Areawide sources are diffuse sources of emissions that are spread over a wide area, such as paints and pesticides.

Local air districts help reduce emissions through limits on emissions from new sources (the New Source Review program) and technology-based requirements for existing sources, called Best Available Retrofit Control Technology and Reasonably Available Control Technology requirements. Air districts adopt and enforce rules governing these sources of emissions.

Businesses in California are subject to the most stringent air quality rules in the country. Local air districts have adopted a number of innovative rules and programs over the years to help reduce emissions. For example, South Coast's innovative program, RECLAIM, provides market incentives for companies to use the cleanest possible technologies. And the San Joaquin Valley has adopted a first-of-its-kind indirect source rule that ensures that new developments bear their fair share of the pollution burden. ARB has suggested over 50 control strategies for stationary sources that many local air districts have adopted.

The proposed local air district measures for each nonattainment area are listed, described, and quantified in the attainment plans for each area. The local measures, coupled with the State Strategy measures, must provide the necessary emission reductions to meet the federal standards.

Transportation and Land Use Planning

In California, local governments are responsible for transportation and land use planning, and transportation plans are an important part of the SIP. Federal law requires a metropolitan region's transportation plan to be complementary to and conform with the region's air quality plan. Transportation and land use strategies can help to reduce the rate of growth in vehicle travel and traffic congestion, which helps reduce the growth in vehicle emissions. All the major metropolitan regions in California have approved plans emphasizing land use strategies that complement their transit and transportation systems and bring more people closer to more destinations. These strategies will help curb emissions by reducing trip distances and increasing use of public transit, carpooling, walking, and biking.

ARB's Proposed New SIP Measures

If emission reductions from the adopted measures are not enough to attain the federal standards, sufficient emission reductions from new strategies must be achieved in order to meet the emission reduction target. The State Strategy's new measures are divided into the following main categories:

New Measure Main Categories

- On-Road Sources
  - Passenger Vehicles
  - Trucks
- Goods Movement Sources
- Off-Road Sources
  - Construction and Other Large Equipment
  - Agricultural Equipment
  - Other Off-Road Sources
- Areawide Sources
  - Consumer Products
  - Pesticides

ARB staff is proposing a comprehensive and far reaching set of new measures to achieve emission reductions needed to address California's most challenging ozone and PM2.5 problems. These measures are designed to make maximum progress toward the federal 8-hour ozone standard in the South Coast and the San Joaquin Valley. The measures include aggressive near-term NOx and SOx emission reduction goals, reflecting the nature and scope of the PM2.5 problem in these regions. To achieve the emission reductions needed for both ozone and PM2.5, the State Strategy proposes new near-term actions that can be completed by 2010 or soon thereafter.

As mentioned in the previous section, the majority of mobile source emissions will soon be from older vehicles and equipment, and therefore most of the proposed new measures in the State Strategy are measures to help clean up or replace older, dirtier vehicles and equipment for which implementation will extend past 2010 and through 2014. Longer-term actions after 2014 will center on the final increment needed to attain the standard in the areas with the worst ozone pollution.

The following is a brief summary of the State Strategy for each of the four main sectors. A description of each individual proposed measure can be found in Chapter 4.

On-Road Sources

California has a long history of success in cleaning up the motor vehicle fleet, particularly through new vehicle standards, as the previous section on adopted SIP measures illustrated. Overall emissions have declined despite rapid growth in vehicle miles traveled due to newer, cleaner vehicles replacing older, dirtier ones. To meet attainment deadlines, however, it's necessary to increase the portion of newer, cleaner

vehicles in the fleet while at the same time reducing emissions from existing vehicles. The new measures for on-road mobile sources serve these two essential objectives.

Passenger Vehicles

California's passenger vehicle emissions standards have done their job to cut emissions to near-zero levels, so the control focus must shift to keeping vehicles clean over their lifetimes. The Smog Check program is the cornerstone of this strategy, currently keeping over 400 tons of ROG+NOx statewide from entering the air each day. The State Strategy envisions an even stronger Smog Check program that would reduce an additional 45 tons per day of emissions statewide in 2014. Proposed new Smog Check measures include annual inspections for cars with high failure rates, such as vehicles over 15 years old and vehicles accumulating high annual miles of travel, and adding inspections of motorcycles and smaller diesel vehicles. More attention will be paid to evaporative emissions through the addition of a low-pressure evaporative test, even as exhaust emission cutpoints are tightened.

The State Strategy proposes to increase the number of vehicles that are voluntarily retired by implementing a scrappage program for vehicles that are off cycle from their Smog Check inspections. This strategy will depend upon funding and would be targeted primarily in the South Coast and San Joaquin Valley. We will also continue to ensure that the fuels used in California are the cleanest-burning available, and mitigate the additional evaporative emissions resulting from the addition of ethanol to gasoline.

These proposed passenger vehicle measures would reduce total NOx and ROG emissions in the South Coast by about 31 tons per day in 2014 and over 22 tons in 2020. Likewise, this measure will reduce total NOx and ROG emissons in the San Joaquin Valley by over 10 tons in 2014 and about 7 tons in 2020.

Trucks

Over the past decade ARB has adopted regulations to make new trucks cleaner, require software upgrades, restrict idling and inspect for smoke emissions. Substantially reducing emissions from existing trucks is key to meeting federal air quality standards, as well as achieving diesel risk reduction and goods movement clean air goals. The State Strategy foresees an expansive in-use diesel truck emission reduction program that would reduce NOx emissions by 47 tons per day in the South Coast and 61 tons per day in the San Joaquin Valley. Direct PM2.5 emissions would also be reduced 2-3 tons per day in both the South Coast and San Joaquin Valley during the same time period.

A comprehensive fleet modernization program from 2010 to 2014 would replace older trucks, repower trucks with cleaner engines, and retrofit trucks with devices to reduce both NOx and PM. The proposed modernization program would be equivalent to replacing approximately 30 percent of the oldest trucks by 2014 with 2010 model year or newer trucks, and will be accomplished through private truck fleet regulations. It is envisioned that the use of public incentive funds will be needed as well to facilitate fleet

modernization on the scale necessary to attain PM2.5 and ozone standards within SIP deadlines.

The in-use diesel truck program also proposes to reduce emissions from trucks registered outside of California and to lessen the effects of emission control deterioration.

Goods Movement Sources

The goods movement sector includes the ships, trains, trucks, and related sources that help move materials and goods from the grower or manufacturer to the consumer. The air quality impact of the goods movement sector is a major issue in areas that host ports, large rail facilities, and major truck routes. Many entities have developed or are developing plans to address the impacts of goods movement, including the California Environmental Protection Agency and the Business, Transportation & Housing Agency, the Air Resources Board, the South Coast Air Quality Management District, several California ports, and two major railroads.

Two factors increase the importance of addressing emissions from goods movement sources. First, international trade through California's ports is growing rapidly: the volume of goods moving through the Port of Los Angeles and the Port of Long Beach – the nation's busiest port complex – is expected to more than double by 2020. Second, the most prominent sources in this sector have historically not been regulated as aggressively as stationary sources or other mobile sources. Goods movement sources are also powered by diesel engines that last longer than their gasoline-powered counterparts, and are often rebuilt before being replaced with newer, cleaner equipment. As a result new engine standards alone will not provide emission reductions in the timeframe allowed to attain the federal PM2.5 and ozone standards.

New measures in the State Strategy focus on the following goods movement sources: ships, locomotives, harbor craft, and port trucks. They closely mirror the measures included in Emission Reduction Plan for Ports and Goods Movement in California, approved by ARB in April 2006, and summarized briefly in Chapter 1. It is estimated that these measures will reduce 20 tons per day of SOx, 49 tons per day of NOx, and about 4 tons per day of direct PM2.5 in the South Coast by 2014.

Ships. Emissions from ocean-going vessels, unlike trucks, are not projected to decrease in future years, since ships have little or no emission controls and run on high emitting bunker fuel, and shipments of cargo containers are projected to grow significantly over the next two decades. Ships currently emit half the statewide SOx emissions, and it is estimated that ships will jump from the sixth to the second highest statewide NOx producer by 2023. It is essential to reduce ship emissions as they are entering our ports and when they are docked through application of demonstrated control technologies, use of cleaner fuels, and operational efficiencies. In December 2005, ARB adopted a rule phasing in the use of cleaner low-sulfur fuel in ship auxiliary engines that will reduce SOx emissions from auxiliary engines by 96 percent and PM2.5 emissions by 83 percent. The State Strategy proposes a combination of measures to further reduce emissions from auxiliary and main ship engines that would reduce

SOx emissions 20 tons per day and NOx by almost 40 tons per day in the South Coast by 2014. It would also reduce PM2.5 emissions from ships by 3 tons per day. Since ARB does not have authority to set ship emission standards, we must work with national and international authorities, as well as the ports, to implement many of the control measures.

Harbor craft. Standards adopted by U.S. EPA provide for new harbor craft engines that have roughly 50 percent less NOx emissions than uncontrolled engines. The State Strategy proposes a new measure requiring harbor craft owners to replace older engines with the newer, cleaner engines and/or add control technologies that reduce emissions, reducing NOx emissions in the South Coast about 5 tons per day by 2014.

Locomotives. The State Strategy calls for replacing existing locomotive engines with engines meeting expected new U.S. EPA Tier 3 standards beginning in 2012, which could reduce NOx emissions by 13-16 tons per day in the South Coast and San Joaquin Valley by 2020. ARB is pushing U.S. EPA to adopt the most stringent standards possible with early implementation, as this measure can only occur once U.S. EPA adopts new locomotive standards.

Port trucks. Most port trucks start out as long-haul trucks and then are put into short-haul use as they get older and are no longer reliable enough for long-haul service. Because port trucks are purchased used, emission standards for new trucks will reduce emissions from trucks servicing the ports later than they will impact the long-haul fleet. The State Strategy proposes a port truck modernization program that would phase in beginning in 2008 and would include replacing older trucks with newer, cleaner trucks and retrofitting engines with emission-reducing control technology, reducing South Coast NOx emissions 2 tons per day by 2014 and 8 tons per day by 2020.

Off-Road Sources

Off-road mobile sources are comprised of a broad range of equipment and vehicle types – from jet skis and all-terrain vehicles to very large construction equipment. Historically, off-road mobile sources have not been as tightly regulated for emission reductions as cars and trucks. In addition, the number of these sources has been increasing steadily as a result of economic growth and increased leisure time. This growth produces an emissions trend that has been increasing, a trend that runs counter to the steady and dramatic decrease in the overall emissions inventory.

There are also a number of source categories related to off-road vehicles that fall outside the usual list of off-road vehicle categories. The categories include refueling tanks, portable fuel tanks, and gas station fueling hoses where emissions are the result of evaporation or permeation of ROG from gasoline.

Off-road sources will soon be the dominant part of the statewide emissions inventory unless emission control technology used in on-road vehicles is successfully transferred to off-road vehicles and equipment and older equipment is replaced with newer, cleaner

models. Emissions from off-road sources can be split into two types, exhaust and evaporation, and the State Strategy addresses both.

ARB staff estimates that the combination of exhaust and evaporative standards for these sources would reduce NOx emissions about 14 tons per day and ROG emissions about 19 tons per day in the South Coast and about 5 tons per day of both ROG and NOx in the San Joaquin Valley by 2014.

Off-Road Equipment – Exhaust Emission Strategies

The success with achieving ultra-low emission levels in cars and trucks provides optimism and expectations that comparable, very low emission levels can also be achieved in off-road sources. The proposed measures focus on applying increasingly more stringent exhaust standards to the various source categories as on-road emission control technologies are successfully demonstrated under off-road conditions. Setting more stringent standards for new equipment is only part of the story. As long as older, uncontrolled sources remain in use, their emissions will continue and become a disproportionately large part of total emissions. The more ambitious proposals are structured to accelerate the replacement of the older equipment with newer, cleaner models.

Diesel construction equipment and other large diesel equipment used in mining, industrial, and oil drilling operations is the largest statewide source of off-road emissions after ocean-going ships. In the San Joaquin Valley, with its large agricultural economy, emissions from equipment used in agricultural operations are significant. Emission standards for new off-road diesel engines have become increasingly more stringent over the past decade, but this equipment often remains in use for long periods of time, sometimes up to 60 years. This long life means that new, lower emission engines are introduced into fleets relatively slowly with the result that the emission reductions will also be slow to materialize.

Construction, Mining, and Industrial Equipment. The State Strategy would help reduce emissions from the in-use fleet by requiring equipment owners to meet a stringent average emissions level across all of their equipment while providing compliance flexibility, and reducing almost 14 tons per day of NOx and 3 tons per day of direct PM2.5 in the South Coast and nearly 5 tons per day of NOx in the San Joaquin Valley by 2014.

Agricultural Equipment. The State Strategy will assess an equipment modernization program once modeling for the San Joaquin Valley's PM2.5 SIP shows to what extent accelerated fleet modernization may be needed.

Other Off-Road Sources – Evaporative Emission Strategies

For many gasoline-fueled off-road sources, evaporative emissions are a significant portion of total emissions. Leaky hoses, tanks, and other parts of an engine's fuel system and refueling infrastructure release hundreds of tons of ROG into the atmosphere a day. Success with low- to no-evaporative emission technology in on-road

sources supports strategies to reduce evaporative emissions to similar low levels in off-road sources. Many newly-regulated sources have exhaust standards but do yet have evaporative standards. The State Strategy proposes to set standards where there are none and make standards more stringent in sources that are not adequately controlled.

Off-road sources used mainly for recreational purposes are large emission contributors, especially during the summer ozone season. The main focus of the State Strategy on this wide array of smaller off-road sources is evaporative emissions. Recreational marine boat engines and off-road recreational vehicles are the biggest targets, with standards being implemented by 2010 and ROG emission reductions growing through 2023 as these newer, cleaner engines become a bigger part of the overall recreational fleet. Refueling tanks, portable fuel tanks, and gas station fueling hoses, where emissions are the result of evaporation or permeation of ROG from gasoline, are also targeted. The proposed measures covering these off-road sources would reduce a combined 17 tons per day of ROG in the South Coast and almost 5 tons per day in the San Joaquin Valley by 2014.

Areawide Sources

Consumer Products

Chemically formulated consumer products such as automotive care products, household care products, and personal care products have been regulated as a source of ROG emissions in five rulemakings since 1989. As a result of these measures, statewide emissions from consumer products will be reduced by over 170 tons per day in 2010, a 40 percent reduction. Despite this progress, population growth in the years ahead is expected to reverse the downward trend of emissions from consumer products, after the latest standards become effective. Therefore, additional controls for this sector will remain important. Indeed, consumer products are expected to become the largest source of ROG emissions in the South Coast, and the third largest source in the San Joaquin Valley by 2020.

The State Strategy will continue ARB's commitment to reduce ROG emissions from consumer products. Rulemakings are expected to be promulgated between 2007 and 2012, expanding beyond the current category-by-category standards and pursuing innovative approaches, reducing ROG emissions about 13 tons in the South Coast and almost 4 tons per day in the San Joaquin Valley.

Pesticides

Pesticide emissions from agricultural and commercial uses fall under the Department of Pesticide Regulation's (DPR) authority. A measure to reduce pesticide emissions is already included in the SIP adopted in 1994. Over the last several years, DPR has worked to ensure compliance with that measure. The State Strategy includes the current results of that effort: DPR's 2008 Pesticide Plan. It is a strategy to reduce ROG emissions from pesticides through regulations that prohibit high emission practices and by requiring products that contribute less to ozone formation.

Local Measures

The proposed new local air district measures, coupled with the new State Strategy measures, must provide the necessary emission reductions to meet the federal standards. The new local measures for each nonattainment area are listed, described, and quantified in the attainment plans for each area.

Impact of Proposed New SIP Measures

The tables on the next five pages show the expected emission reductions from the proposed new SIP measures in the South Coast and San Joaquin Valley in both 2014 and 2020. The first table shows the expected NOx and ROG emission reductions for South Coast and San Joaquin Valley for 2023 – the year in which the emission reduction target must be met for the expected ozone attainment date of 2024 for these regions.

The table on Page 64 lists for each proposed new measure the agencies responsible for implementation, the expected dates of rulemaking or promulgating action, and the expected dates of measure implementation.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

South Coast and San Joaquin Valley - 2023

	South Coast		San Joaquin Valley	
Proposed New SIP Measures	**NOx**	**ROG**	**NOx**	**ROG**
ON-ROAD SOURCES				
Passenger Vehicles	**7.1**	**10.5**	**2.1**	**3.3**
Smog Check Improvements (BAR)	6.9	7.5	2.1	1.9
Expanded Vehicle Retirement	0.2	0.5	0.0	0.1
Modifications to Reformulated Gasoline Program	--	2.5	--	1.3
Trucks	**18.3**	**1.7**	**21.2**	**1.7**
Cleaner In-Use Heavy-Duty Trucks	18.3	1.7	21.2	1.7
GOODS MOVEMENT SOURCES	**99.2**	**2.5**	**16.4**	**1.3**
Auxiliary Ship Engine Emission Reductions	30.8	--	--	--
Cleaner Main Ship Engines and Fuel	39.9	--	--	--
Port Truck Modernization	7.0	--	--	--
Accelerated Introduction of Cleaner Line-Haul Locomotives*	15.6	1.9	16.4	1.3
Clean Up Existing Harbor Craft	5.9	0.6	--	--
OFF-ROAD SOURCES				
Off-Road Equipment	**12.2**	**2.0**	**4.7**	**0.8**
Cleaner In-Use Off-Road Equipment (over 25hp)	12.2	2.0	4.7	0.8
Agricultural Equipment	**NYQ**	**NYQ**	**NYQ**	**NYQ**
Other Off-Road Sources	**2.4**	**42.9**	**0.6**	**11.8**
New Emission Standards for Recreational Boats	2.4	17.7	0.6	5.3
Expanded Off-Road Rec. Vehicle Emissions Standards	--	17.4	--	4.8
Portable Outboard Marine Tank Evaporative Standards	--	4.0	--	0.7
Refueling Gas Storage Tank Evaporative Standards	--	2.1	--	0.7
Gas Station Fueling Hose Evaporative Standards	--	1.7	--	0.3
Above Ground Storage Tanks Enhanced Vapor Recovery	--	NYQ	--	NYQ
AREAWIDE SOURCES				
Consumer Products	**--**	**13.7**	**--**	**3.8**
Consumer Products Program	--	13.7	--	3.8
Pesticides	**--**	**NYQ**	**--**	**NYQ**
DPR 2008 Pesticide Plan			**--**	**--**
Total Emission Reductions from Proposed New SIP Measures	**139**	**73**	**45**	**23**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Department of Pesticide Regulation.

* Locomotive measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover.

Note: Emission reductions reflect the combination impact of regulations and supportive incentive programs.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

South Coast -- 2014

Proposed New SIP Measures	NOx	ROG	PM2.5	SOx
ON-ROAD SOURCES				
Passenger Vehicles	**14.4**	**17.7**	**0.2**	**--**
Smog Check Improvements (BAR)	12.0	10.5	0.2	--
Expanded Vehicle Retirement	2.4	2.8	0.05	--
Modifications to Reformulated Gasoline Program	--	4.4	--	--
Trucks	**47.3**	**5.1**	**3.0**	**--**
Cleaner In-Use Heavy-Duty Trucks	47.3	5.1	3.0	--
GOODS MOVEMENT SOURCES	**49.4**	**1.2**	**3.6**	**20.3**
Auxiliary Ship Engine Cold Ironing and Other Clean Technology	18.5	--	0.3	0.4
Cleaner Main Ship Engines and Fuel	20.0	--	2.4	19.7
Port Truck Modernization	2.0	--	0.5	--
Accelerated Introduction of Cleaner Line-Haul Locomotives*	4.3	0.7	0.2	--
Clean Up Existing Harbor Craft	4.6	0.5	0.2	--
OFF-ROAD SOURCES				
Off-Road Equipment	**13.8**	**2.2**	**2.5**	**--**
Cleaner In-Use Off-Road Equipment (over 25hp)	13.8	2.2	2.5	--
Agricultural Equipment	**NYQ**	**NYQ**	**NYQ**	**0**
Other Off-Road Sources	**0.4**	**16.9**	**--**	**--**
New Emission Standards for Recreational Boats	0.4	4.2	--	--
Expanded Off-Road Recreational Vehicle Emission Standards	--	7.8	--	--
Portable Outboard Marine Tank Evaporative Standards	--	1.8	--	--
Refueling Gasoline Storage Tank Evaporative Standards	--	1.6	--	--
Gas Station Fueling Hose Evaporative Standards	--	1.5	--	--
Enhanced Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	--
AREAWIDE SOURCES				
Consumer Products	**--**	**12.9**	**--**	**--**
Consumer Products Program	--	12.9	--	--
Pesticides	**--**	**NYQ**	**--**	**--**
DPR 2008 Pesticide Plan				
Total Emission Reductions from Proposed New Measures	**125**	**55**	**9**	**20**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Department of Pesticide Regulation

* Locomotive measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover.

Note: Emission reductions reflect the combination impact of regulations and supportive incentive programs.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

South Coast -- 2020

Proposed New SIP Measures	NOx	ROG	PM2.5	SOx
ON-ROAD SOURCES				
Passenger Vehicles	**9.6**	**12.9**	**0.3**	**--**
Smog Check Improvements (BAR)	8.3	8.7	0.2	--
Expanded Vehicle Retirement	1.3	1.2	0.06	--
Modifications to Reformulated Gasoline Program	--	3.0	--	--
Trucks	**26.9**	**2.6**	**1.5**	**--**
Cleaner In-Use Heavy-Duty Trucks	26.9	2.6	1.5	--
GOODS MOVEMENT SOURCES	**87.1**	**2.3**	**4.3**	**26.1**
Auxiliary Ship Engine Cold Ironing and Other Clean Technology	28.3	--	0.4	0.7
Cleaner Main Ship Engines and Fuel	32.3	--	3.1	25.4
Port Truck Modernization	8.0	--	0.3	--
Accelerated Introduction of Cleaner Line-Haul Locomotives*	13.4	1.8	0.3	--
Clean Up Existing Harbor Craft	5.1	0.5	0.2	--
OFF-ROAD SOURCES				
Off-Road Equipment	**13.2**	**2.1**	**1.7**	**--**
Cleaner In-Use Off-Road Equipment (over 25hp)	13.2	2.1	1.7	--
Agricultural Equipment	**NYQ**	**NYQ**	**NYQ**	**0**
Other Off-Road Sources	**1.6**	**33.7**	**--**	**--**
New Emission Standards for Recreational Boats	1.6	12.8	--	--
Expanded Off-Road Recreational Vehicle Emission Standards	--	14.5	--	--
Portable Outboard Marine Tank Evaporative Standards	--	2.9	--	--
Refueling Gasoline Storage Tank Evaporative Standards	--	1.9	--	--
Gas Station Fueling Hose Evaporative Standards	--	1.6	--	--
Enhanced Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	--
AREAWIDE SOURCES				
Consumer Products	**--**	**13.5**	**--**	**--**
Consumer Products Program	--	13.5	--	--
Pesticides	**--**	**NYQ**	**--**	**--**
DPR 2008 Pesticide Plan				
Total Emission Reductions from Proposed New Measures	**138**	**67**	**8**	**26**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Department of Pesticide Regulation

* Locomotive measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover.

Note: Emission reductions reflect the combination impact of regulations and supportive incentive programs.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

San Joaquin Valley - 2014

Proposed New SIP Measures	NOx	ROG	PM2.5	SOx
ON-ROAD SOURCES				
Passenger Vehicles	**3.8**	**6.5**	**0.06**	**--**
Smog Check Improvements (BAR)	3.3	2.9	0.05	--
Expanded Vehicle Retirement	0.5	0.7	0.01	--
Modifications to Reformulated Gasoline Program	--	2.9	--	--
Trucks	**61.4**	**6.4**	**3.6**	**--**
Cleaner In-Use Heavy-Duty Trucks	61.4	6.4	3.6	--
GOODS MOVEMENT SOURCES	**7.2**	**0.5**	**0.18**	
Auxiliary Ship Engine Cold Ironing and Other Clean Technology	--	--	--	--
Cleaner Main Ship Engines and Fuel	--	--	--	--
Port Truck Modernization	--	--	--	--
Accelerated Introduction of Cleaner Line-Haul Locomotives*	7.2	0.5	0.18	--
Clean Up Existing Harbor Craft	--	--	--	--
OFF-ROAD SOURCES				
Off-Road Equipment	**4.8**	**0.8**	**0.8**	**--**
Cleaner In-Use Off-Road Equipment (over 25hp)	4.8	0.8	0.8	--
Agricultural Equipment	**NYQ**	**NYQ**	**NYQ**	**0**
Other Off-Road Sources	**0.1**	**4.5**	**--**	**--**
New Emission Standards for Recreational Boats	0.1	1.2	--	--
Expanded Off-Road Recreational Vehicle Emission Standards	--	2.2	--	--
Portable Outboard Marine Tank Evaporative Standards	--	0.4	--	--
Refueling Gasoline Storage Tank Evaporative Standards	--	0.5	--	--
Gas Station Fueling Hose Evaporative Standards	--	0.2	--	--
Enhanced Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	--
AREAWIDE SOURCES				
Consumer Products	**--**	**3.2**	**--**	**--**
Consumer Products Program	--	3.2	--	--
Pesticides	**--**	**NYQ**	**--**	**--**
DPR 2008 Pesticide Plan	**--**	**--**	**--**	**--**
Total Emission Reductions from Proposed New Measures	**77**	**22**	**5**	**0**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Department of Pesticide Regulation

* Locomotive measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover.

Note: Emission reductions reflect the combination impact of regulations and supportive incentive programs.

Expected Emission Reductions from Proposed New SIP Measures
(tons per day)

San Joaquin Valley - 2020

Proposed New SIP Measures	NOx	ROG	PM2.5	SOx
ON-ROAD SOURCES				
Passenger Vehicles	**2.7**	**4.1**	**0.06**	**--**
Smog Check Improvements (BAR)	2.4	2.2	0.05	--
Expanded Vehicle Retirement	0.3	0.3	0.01	--
Modifications to Reformulated Gasoline Program	--	1.6	--	--
Trucks	**30.2**	**3.3**	**1.6**	**--**
Cleaner In-Use Heavy-Duty Trucks	30.2	3.3	1.6	--
GOODS MOVEMENT SOURCES	**15.6**	**1.2**	**0.42**	
Auxiliary Ship Engine Cold Ironing and Other Clean Technology	--	--	--	--
Cleaner Main Ship Engines and Fuel	--	--	--	--
Port Truck Modernization	--	--	--	--
Accelerated Introduction of Cleaner Line-Haul Locomotives*	15.6	1.2	0.42	--
Clean Up Existing Harbor Craft	--	--	--	--
OFF-ROAD SOURCES				
Off-Road Equipment	**4.9**	**0.8**	**0.6**	**--**
Cleaner In-Use Off-Road Equipment (over 25hp)	4.9	0.8	0.6	--
Agricultural Equipment	**NYQ**	**NYQ**	**NYQ**	**0**
Other Off-Road Sources	**0.4**	**9.2**	**--**	**--**
New Emission Standards for Recreational Boats	0.4	3.8	--	--
Expanded Off-Road Recreational Vehicle Emission Standards	--	4.0	--	--
Portable Outboard Marine Tank Evaporative Standards	--	0.5	--	--
Refueling Gasoline Storage Tank Evaporative Standards	--	0.7	--	--
Gas Station Fueling Hose Evaporative Standards	--	0.2	--	--
Enhanced Vapor Recovery for Above Ground Storage Tanks	--	NYQ	--	--
AREAWIDE SOURCES				
Consumer Products	**--**	**3.6**	**--**	**--**
Consumer Products Program	--	3.6	--	--
Pesticides	**--**	**NYQ**	**--**	**--**
DPR 2008 Pesticide Plan	**--**	**--**	**--**	**--**
Total Emission Reductions from Proposed New Measures	**54**	**22**	**3**	**0**

NYQ = Not Yet Quantified. BAR = Bureau of Automotive Repair. DPR = Department of Pesticide Regulation

* Locomotive measure relies on U.S. EPA rulemaking and industry agreement to accelerate fleet turnover.

Note: Emission reductions reflect the combination impact of regulations and supportive incentive programs.

State Strategy
Proposed New SIP Measures
Implementing Agency – Expected Action – Expected Implementation

Proposed New SIP Measures	Implementing Agency	Expected Action	Expected Implementation
ON-ROAD SOURCES			
Passenger Vehicles			
Smog Check Improvements	BAR	2007-2008	By 2010
Expanded Vehicle Retirement	ARB/BAR	2010	2010
Modifications to Reformulated Gasoline Program	ARB	2007	2008
Trucks			
Cleaner In-Use Heavy-Duty Trucks	ARB	2007-2008	2010-2015
GOODS MOVEMENT SOURCES			
Auxiliary Ship Engine Cold Ironing and Other Clean Technology	EPA/ARB/ Local	2007	Phase-in starting 2010
Cleaner Main Ship Engines and Fuel	EPA/ARB Local	Fuel: 2007 Engines: 2009	2007-2010 Phase-in starting 2010
Port Truck Modernization	ARB/Local	2007	2008-2020
Accelerated Introduction of Cleaner Line-Haul Locomotives	EPA/ARB	2007-2008	By 2012
Clean Up Existing Harbor Craft	ARB	2007	2008-2018
OFF-ROAD SOURCES			
Off-Road Equipment			
Cleaner In-Use Off-Road Equipment (over 25hp)	ARB	2007	Phase-in starting 2008
Agricultural Equipment			
Cleaner In-Use Agricultural Equipment	ARB/Local	TBD	TBD
Other Off-Road Sources			
New Emission Standards for Recreational Boats	ARB	2009-2010	2012-2013
Expanded Off-Road Recreational Vehicle Emission Standards	ARB	By 2010	2012-2015
Portable Outboard Marine Tank Evaporative Standards	ARB	2007	2010
Refueling Gasoline Storage Tank Evaporative Standards	ARB	2008	2010
Gas Station Fueling Hose Evaporative Standards	ARB	2008	2012
Enhanced Vapor Recovery for Above Ground Storage Tanks	ARB	2007	Phase-in starting 2007
AREAWIDE SOURCES			
Consumer Products			
Consumer Products Program	ARB	2007-2008 2010-2012	By 2010 By 2012-2014
Pesticides			
DPR 2008 Pesticide Plan	DPR	2008	2008

TBD = To Be Determined.

Role of Funding and Incentive Programs

Over the past 40 years, California has steadily improved air quality in the face of tremendous economic and population growth. The vast majority of that progress has come from effective regulations. Accordingly, ARB staff expects State and federal regulations to play the primary role in implementing the State Strategy. In the regulatory paradigm, polluting sources pay for the necessary emission controls as part of doing business. Regulated industries may pass these costs on to consumers in the form of higher prices, although competition and other factors may prevent some companies from recouping all of their control costs. Low-interest loans with extended payment periods are available to aid smaller businesses that need upfront capital to comply.

In recent years, regulatory programs have been supplemented with financial incentives to accelerate voluntary actions, such as replacing older equipment. Incentive programs like the Carl Moyer Program are both popular and effective. They also help to demonstrate emerging technologies that then can be used to set a tougher emissions benchmark for regulatory requirements. Most of the existing incentive programs are designed to pay for the incremental cost between what is required by regulation and advanced technology that exceeds that level. The incentive programs are publicly funded through fees paid by California vehicle owners as part of their annual registrations, smog inspections or new tire purchases. California is currently investing up to $140 million per year to clean up older, higher emission sources.

The support for clean air incentive funding from Governor Schwarzenegger, the Legislature, and California's voting public is reflected in the passage on November 7, 2006, of the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006. The Bond Act includes $1 billion to accelerate the cleanup of air pollution caused by goods movement activities in California. With appropriation by the Legislature, and subject to such conditions and criteria contained in a statute that it will enact, ARB will appropriate this money to fund emission reductions from activities related to the movement of freight along California's trade corridors.

Federal Actions Needed

Measures in the State Strategy to reduce emissions from interstate and international sources rely on the federal government to develop more stringent emissions standards and to ensure these standards go into effect as soon as possible. Emission reductions from locomotives, off-road equipment, marine auxiliary engines, and harbor craft are a significant part of the State Strategy. Proposed State measures would accelerate the introduction of cleaner engines and equipment, but the emissions reductions rely on the availability of cleaner new engines. Long-term federal actions to ensure ozone standards are reached in the South Coast and San Joaquin Valley are also needed and are addressed in the next section.

ARB is proposing several measures to reduce ship emissions through a combination of regulations, incentives, and actions by ports and the private sector. However, national and international action to clean up shipping fleets is also needed to fully realize our

clean air goals. And aircraft emissions, which will become one of the South Coast's top five NOx sources by 2020, are unaddressed in the State Strategy due to the lack of effective international standards.

California must rely on U.S. EPA to represent its interests before foreign or international regulatory bodies that have the ability to reduce emissions from international goods movement sources. In this role, U.S. EPA should advocate for the adoption of cleaner ship emission standards and less polluting practices by the International Maritime Organization.

Long-Term Concepts

The federal law recognizes that to meet air quality standards regions with the worst air quality must rely on strategies that cannot be successful without significant technological advances, improvements to reduce cost or increase cost-effectiveness, or the securing of a dependable stream of expanded financial incentives. Federal law specifically authorizes long-term measures for extreme nonattainment areas. When the South Coast and San Joaquin Valley air districts request reclassification, the long-term technology provisions become applicable. This section discusses potential long-term concepts that will be evaluated and refined for the next rounds of SIPs. Also discussed are ideas for further exploration and potential federal actions.

While this State Strategy's new measures will provide sizeable benefits, the emission reductions will not be enough to meet the federal 8-hour ozone standard in the South Coast and San Joaquin Valley. These areas will need significant additional emission reductions beyond those we will realize with the commitments in the State Strategy. To meet our current obligations under federal law, we must secure further emission reductions from long-term concepts by 2023.

ARB has a long-standing history of successfully adopting and implementing both technology-advancing strategies and innovative emission control techniques. By working closely with the regulated industry and research scientists, ARB staff have been able to craft regulations that are stringent enough to compel technology development, yet flexible enough to encourage industry innovations.

In parallel with work on the proposed near-term regulatory actions in the State Strategy, ARB will investigate the feasibility of emission reduction approaches that may not be currently ready for implementation. The investigation will cover emerging technologies as well as the extent to which emission reduction strategies such as market incentive programs, pollution prevention, public education, and voluntary efforts can complement and enhance the effectiveness of traditional control approaches. The output of this process will define the next round of ARB actions to be included in a future SIP revision.

Potential Long-Term Concepts

Approaches that ARB will evaluate for possible inclusion in the next SIP update include the following.

Passenger vehicles: look for further reductions from reduced deterioration of emission reduction components. While new cars are very clean, it may be possible to improve the on-board diagnostic capability of passenger vehicles and heavy-duty trucks to better target sources of emissions and to improve and encourage higher rates of repair.

Tighten emission standards wherever possible: review all categories of engines and vehicles to ensure that the cleanest cost-effective technologies are in place. For example:

- Exhaust and evaporative standards for on-road motorcycles.
- Second generation catalyst-based emission standards for inboard/stern drive marine engines.
- Tighter exhaust emission limits for small off-road engines.

Cleaner ground support equipment: push for increased electrification. Captured vehicle and equipment fleets used at airports are cleaner today through natural turnover and accelerated turnover spurred through cooperative State and local government and air company efforts. However, additional opportunities for increased electrification remain.

Agricultural equipment: incentives for accelerated modernization. Once NOx emission reduction needs for San Joaquin Valley PM2.5 attainment are identified, evaluate the need and potential to accelerate reductions beyond the natural replacement of older, dirtier agricultural engines to newer, cleaner engines.

Air quality priority for federal transportation funding: work with local governments to prioritize federal transportation funding uses to better support air quality goals. The federal Congestion and Air Quality Improvement (CMAQ) Program annually provides to county transportation agencies over $200 million in the South Coast and about $50 million in the San Joaquin Valley through 2009. The purpose of the CMAQ Program, according to Federal Highway Administration 2006 guidance, is to fund transportation projects that will contribute to attainment of national ambient air quality standards.

Ideas Requiring Further Exploration

Air quality control is an ever emerging field. At ARB, research and other staff work are continually developing new ways to control air pollutants and improve public health. At any one time there are always emission reduction ideas on the horizon that we have not fully explored or developed. Some of these approaches that are in various stages of development could turn out to be effective strategies at some point in the future.

The following approaches show promise as potential emission reduction strategies. However, because of technological constraints and uncertain authority, they are less defined and will require significant exploration prior to becoming concepts.

Explore opportunities for cleaner fuels. The near-term focus for fuels-related efforts in California will be to develop low carbon fuels in response to the Governors 2007 Executive Order. Separate from that effort, we will continue to evaluate the opportunities for cost-effective reformulations to reduce criteria pollutants emissions.

Pursue additional emission reductions from consumer products. Despite the actions to date and the new measures proposed in this plan, consumer products continue to be an ever larger percentage of ROG emissions because of population growth. ARB will continue to look for even cleaner consumer product technologies and innovative approaches to reduce emissions such as reactivity-based and market-based strategies. This would continue the search for new approaches to achieve emission reductions initiated within the near-term consumer product measure.

Explore approaches to further reduce volatile emissions from pesticides. With the Department of Pesticide Regulation as the lead, work with interested stakeholders to determine how pesticide emissions could be further reduced.

Continue and enhance current public education and outreach programs. Public and private energy conservation and efficiency programs would continue and expand. The establishment of a statewide public education campaign to reduce air pollution could be considered, and might include ideas to engage the public through (1) public education that more clearly connects voluntary clean air actions with public health benefits, and (2) increasing awareness of available low-emitting consumer products, paints, vehicles, lawn equipment, and recreational vehicles licensed to use clean air "green" labels.

Advocate for efficient regional land use and transportation strategies. In California, local governments have the authority over most transportation funding and land use decisions. The most effective way for regions to curb long-term growth of vehicle travel and lessen auto emissions is to build on and enhance current efforts to implement transportation and land use strategies proven to reduce vehicle trips and decrease average trips lengths.

Possible Federal Actions

Adopt more stringent standards for sources under federal control. U.S. EPA should move as fast as possible to lower standards for sources under its control, keeping in mind California's air quality challenge and attainment deadlines. There are categories of emission sources that we do not have the authority to regulate at the State level. We also do not have the ability to regulate sources in markets outside of California that then operate within California. Not only would federal action lower emissions for new sources, but it would allow State and local actions to lower emissions from existing sources by setting in-use rules that speed up the integration of the cleaner engines and technology into California fleets. These sources include: ships, locomotives, harbor craft, aircraft, and off-road equipment and vehicles.

Federal incentives for cleaner technology. Federal funding sources for clean air projects, as well as federal tax incentives promoting the manufacture, sale, and

purchase of cleaner vehicles, equipment, and technology could enhance California's aggressive incentive programs.

Ozone Attainment Demonstrations

The table on the following page illustrates how the State Strategy will meet the emission reduction targets for ozone in the South Coast and San Joaquin Valley.

This document has presented ARB staff's assessment of the State Strategy for the San Joaquin Valley and the South Coast in detail. ARB staff has also evaluated the impact of the proposed State Strategy on all 15 ozone nonattainment areas. For the remaining areas, modeling results and air quality data analyses show that, with the continued reductions in emissions on track to occur in each area, all will be able to show attainment by 2021 or earlier with identified measures.

ARB staff projects that Sacramento will attain by 2019 with a reclassification from serious to severe and will need additional reductions from ARB's proposed new measures. San Diego and Ventura are projected to attain by their deadline, although Ventura may consider a reclassification in their public SIP process for insurance. Transport impacted areas, especially downwind of the South Coast—the Antelope Valley, the Mojave Desert, and the Coachella Valley—will need to rely on new reductions that will occur upwind and will need to request reclassification to get the needed time. Areas downwind of the Central Valley—Western Nevada, Amador, Calaveras, Tuolumne, Mariposa, and Kern Counties—are projected to attain by their 2014 deadline with already adopted measures. Air quality modeling for these areas is new and ARB staff is continuing to evaluate the results. Finally, three areas--the Bay Area, Butte County, and the Sutter Buttes--now attain the ozone standard.

Setting the Ozone Emission Reduction Target (tons per day)

	Nonattainment Area			
	South Coast (2023)		San Joaquin Valley (2023)	
	NOx	ROG	NOx	ROG
2006 Emissions Inventory	972	732	650	452
Carrying Capacity	238	304	160	345
Emission Reduction Target	734	428	490	107

(2006 Emissions Inventory) – (Carrying Capacity) = (Emissions Reduction Target)

2006 Emissions Inventory = Amount of ozone-forming emissions.
Carrying Capacity = Pollutant emissions limit that ensures air quality standards are met.
Emission Reduction Target = Amount of emissions that must be reduced to meet the standard.

Meeting the Ozone Emission Reduction Target (tons per day)

	Nonattainment Area			
	South Coast (2023)		San Joaquin Valley (2023)	
	NOx	ROG	NOx	ROG
Emission Reduction Target	734	428	490	38
Emission Reductions from Adopted SIP Measures	467	198	350	38
Emission Reductions from New Local Measures*	14	18	8	46
Emission Reductions from New State Measures	139	73	45	23
Long-Term Measures	114	139	87	--
Total Reductions	734	428	490	107

Emission Reductions from Adopted SIP Measures. Emissions reduced from measures adopted through 2006.
Emission Reductions from New Measures. Emissions reduced from measures in the State Strategy or new local measures adopted after 2006.
Long-Term Measures. Emissions reduced from measures adopted after 2020 that rely on new or evolving technology, as allowed in section 182(e)(5) of the Clean Air Act.

* Impact of South Coast local measures have not yet been estimated by air district staff for 2023. Estimates for 2020 were used.

Next Steps

This document has presented ARB's staff proposed State Strategy and provided a status report on how the State Strategy will support the attainment needs in the San Joaquin Valley and the South Coast. ARB expects that the San Joaquin Valley air district will release an update to its local SIP concurrent with ARB release of this document. We expect the South Coast air district will release an update shortly after ARB's release. ARB staff is currently targeting a May hearing of the Board for its consideration of the proposed State Strategy. The San Joaquin Valley and South Coast air districts are currently planning on local board hearings in the April-May timeframe. Other air districts are completing their SIPs on a similar schedule.

Prior to the ARB hearing, staff will release a final proposed draft of the State Strategy. Release will be 45 days before a scheduled hearing. That final draft will include additional elements that are not included in this draft. Elements that staff expects to include in the final draft include.

- Updated measures
- Complete attainment demonstrations
- Detailed air quality modeling and modeling protocols
- Corroborative analyses
- Economic analysis
- Environmental impacts analysis
- Detailed emissions data
- Reasonable Further Progress demonstrations
- Contingency measures
- Measure commitments
- Emissions budgets

ARB staff will also hold public workshops to solicit comment on the proposed State Strategy. Those workshops are not yet scheduled.

4. PROPOSED NEW SIP MEASURES – Descriptions

Introduction

ARB staff is proposing a comprehensive and far reaching set of new measures to achieve emission reductions needed to address California's most challenging ozone and PM2.5 problems. These measures are designed to make maximum progress toward the federal 8-hour ozone standard in the South Coast and the San Joaquin Valley. The measures include aggressive near-term NOx and SOx emission reduction goals, reflecting the nature and scope of the PM2.5 problem in these regions. To achieve the emission reductions needed for both ozone and PM2.5, the State Strategy proposes new near-term actions that can be completed by 2010 or soon thereafter.

Need for Fleet Modernization

More than any other air pollution control effort, ARB's mobile source program has moved the State's nonattainment areas closer to meeting federal air quality standards. California has dramatically tightened emission standards for new on-road and off-road mobile sources and fuels. As new engines have become cleaner and cleaner, the emissions contribution from older vehicles has been growing to the extent that it will soon make up the majority of mobile source emissions. For example, by 2014, heavy-duty trucks 14 years or older will produce 51 percent of total heavy-duty truck NOx emissions while only traveling 20 percent of total truck miles. The same holds true for all on-road vehicles combined, where vehicles over 14 years old will produce almost 60 percent of total NOx emissions by 2014 but just 20 percent of total miles traveled.

While California has made significant strides in reducing emissions from mobile sources as they age, the benefits of in-use control programs are limited by the underlying engine technology and controls. The majority of new measures in the State Strategy are in-use measures – programs to help clean up or replace older, dirtier vehicles and equipment. We simply cannot wait for the natural turnover of older vehicles and equipment (1-5 percent annual turnover depending on vehicle or equipment type) being replaced with newer, cleaner vehicles. The challenge is that these measures have a much more direct impact on businesses and individuals in California than do engine standards that have a more direct impact on manufacturers. ARB's fleet rules will affect owners of public and private vehicles and equipment that operate in nonattainment areas throughout the State.

Compliance flexibility has historically been included in ARB regulations – allowing the most cost-effective methods to be used by those who must meet emission requirements. And while lower-cost emission control devices will likely play an important role in lowering emissions from existing mobile fleets, a certain degree of more costly engine and vehicle replacements will be needed to lower fleet

emissions. This will place a larger financial burden on owners of vehicles and equipment, so the appropriate role of incentive funds will be an issue. It will be important to prioritize the use of any incentive funds in a way that generates maximum emission reductions and health protection benefits, while helping to reduce the burden for those most in need of financial assistance. It is also important to recognize that public funds can pay for only a relatively small portion of the cost for necessary modernization of California's diesel engine fleets.

The nature of the proposed new measures (enforceable rules) and California's history of supportive financial incentives provide a sound basis for reductions from incentive programs to meet federal requirements for SIP approval.

Accountability for Emission Reductions

California's SIP must outline the plan for meeting air quality standards in all of its nonattainment areas. When ARB staff proposes its SIP State Strategy for Board approval, it will include an enforceable commitment to achieve the overall goals set. The details of each new measure are publicly considered during separate formal rulemaking processes. If a particular measure does not ultimately achieve the emission reductions estimated in the SIP, the State is still bound to achieve the total aggregate emission reduction commitment, whether this is realized through additional reductions from other new measures, or from alternative control measures or incentive programs.

Summary of Proposed New SIP Measures

ON-ROAD SOURCES

Passenger Vehicles

Improvements and Enhancements to California's Smog Check Program

Low Pressure Evaporative Test. Require low pressure evaporative system testing and repair of evaporative system leaks for all vehicles subject to Smog Check inspection.

More Stringent Cutpoints. Set more stringent pass/fail cutpoints to ensure more cars would have more complete and durable repairs.

Annual Inspections for Older Vehicles. Inspect older vehicles annually rather than every two years. Older vehicles tend to have greater deterioration of emission controls, and consequently, higher emissions.

Annual Inspections for High Annual Mileage Vehicles. Inspect annually, rather than every two years, vehicles that accrue very high mileage on an annual basis. High mileage vehicles tend to have greater deterioration of emission controls and, consequently, higher emissions.

Add Visible Smoke Test. As part of the Smog Check test, include a check for visible smoke to identify vehicles with excess particulate matter (PM) emissions.

Inspection of Light- and Medium-Duty Diesels. Include light- and medium-duty diesel vehicles in the Smog Check program to provide for improved maintenance and reduced emissions for this part of the fleet, and require the repair of poorly maintained or old emission systems.

Inspection of Motorcycles. Include motorcycle inspections as part of Smog Check. Studies indicate that motorcycles are subject to high rates of exhaust system tampering.

Expanded Passenger Vehicle Retirement. Increase the number of vehicles that are voluntarily retired by implementing a scrappage program for vehicles that are off-cycle from their Smog Check inspections.

Modifications to Reformulated Gasoline Program. Modify California's Reformulated Gasoline Program to offset ROG emissions due to the increased use of ethanol. This rulemaking activity is currently underway and is intended to fully mitigate the emission increase, which has been incorporated in the current emissions inventory.

Trucks

Cleaner In-Use Heavy-Duty Trucks. This proposed measure is a comprehensive in-use diesel truck emissions reduction program that includes a fleet modernization rule and an enhanced screening and repair program. Fleet modernization would focus on overcoming the typically slow rate of heavy-duty truck turnover by requiring truck owners to meet specified emission levels through replacing or cleaning up the oldest trucks in their fleets, and would also include a program for out-of-state trucks. ARB's roadside heavy-duty vehicle inspection program would be expanded to more effectively identify and screen trucks that need emission control system repairs.

GOODS MOVEMENT SOURCES

Auxiliary Ship Engine Cold Ironing and Other Clean Technology. Reduce emissions from ships at berth with at-dock technologies such as cold ironing (electrical power) and other clean technologies.

Cleaner Main Ship Engines and Fuel. Further reduce emissions from main engines through added retrofits such as selected catalytic reduction. Support efforts by ports and appropriate local entities to accelerate use of cleaner ships and rebuilt engines through other tools such as lease restrictions. Require ships

to use low sulfur diesel fuel in main engines when operating within 24 nautical miles of shore.

Port Truck Modernization. Retrofit or replace older heavy-duty diesel trucks that service ports. Work with port authorities to prevent adding older trucks to the fleet. ARB rulemaking process for this proposed measure has begun.

Accelerated Introduction of Cleaner Line-Haul Locomotives. Replace existing locomotive engines with cleaner Tier 3 engines beginning in 2012 and conduct concurrent rebuilds of older engines to Tier 2.5 standards. This measure can only occur if U.S. EPA adopts Tier 3 engines standards for locomotives.

Clean Up Existing Commercial Harbor Craft. Require owners of existing commercial harbor craft to replace old engines (both propulsion and auxiliary) with newer cleaner engines and/or add emission control technologies that clean up engine exhaust. ARB rulemaking for this proposed measure is underway.

OFF-ROAD SOURCES

Construction and Other Equipment

Cleaner In-Use Off-Road Equipment. Establish fleet average emission limits for off-road equipment (over 25 horsepower) that would require older, dirtier engines to be replaced with engines reflecting current technologies or retrofitted with emission control devices. ARB rulemaking for this proposed measure is in process.

Agricultural Equipment

Agricultural Equipment Fleet Modernization. Accelerate the modernization of the fleet of agricultural equipment used in California, removing older, dirtier equipment from service to be replaced with engines reflecting cleaner technologies.

Evaporative and Exhaust Strategies

New Emission Standards for Recreational Boats. Adopt catalyst-based standards (5 g/kW-hr) for new outboard engines and evaporative emission standards to address all sources of recreational boat evaporative emissions.

Off-Road Recreational Vehicle Expanded Emission Standards. Adopt exhaust and evaporative emission standards to reduce the amount of ROG from off-highway motorcycles and all-terrain vehicles.

Portable Outboard Marine Tank Evaporative Standards. Set evaporative standards for removable fuel tanks used on outboard recreational boats.

Refueling Gasoline Tank Evaporative Standards. Set evaporative standards for refueling gasoline tanks typically mounted on pickups and large recreational vehicles and used to refuel equipment and other smaller vehicles.

Gas Station Refueling Hose Evaporative Standards. Set evaporative standards for gas station pump hoses.

Enhanced Vapor Recovery for Above Ground Storage Tanks. Implement an enhanced vapor recovery certification process and new performance standards and specifications for large fuel tanks used extensively in agricultural operations.

AREAWIDE SOURCES

Consumer Products

Tighten Standards. Tighten standards or require product reformulation for consumer products categories through several rulemakings through 2010.

Pesticides

New Pesticide Strategies. The California Department of Pesticide Regulation will further reduce emissions from commercial and agricultural pesticide use in California through reformulation, reduced usage, and innovative technologies and practices.

Improvements and Enhancements to California's Smog Check Program

California's passenger vehicle emissions standards have been extremely effective -- a new 2005 car was 97 percent cleaner than a new 1980 car. In order to reduce the emissions necessary to reach air quality goals, however, the focus must shift to keeping vehicles clean over their lifetimes. The Smog Check program is the cornerstone of this effort, keeping over 400 tons of smog-forming emissions from entering the air each day.

The State Strategy envisions an even stronger Smog Check program, adding tests that will reduce excess emissions and including vehicle types that are now exempt to better ensure that all passenger vehicles in California keep running clean. Staff has estimated that adding the following tests to Smog Check will reduce ROG and NOx emissions from passenger vehicles 10 percent in 2014. This equates to reducing 11 tons per day of ROG and 13 tons per day of NOx in the South Coast in 2014.

Low Pressure Evaporative Test

Over half of smog-forming emissions from 1976 through 1995 cars comes from fuel evaporating from leaks in the fuel system. A functional check of the gas cap is currently included in Smog Check, but not a check of the vehicle's fuel tank and vapor lines, which play an important part in controlling evaporative emissions. This measure would add a low pressure evaporative test to Smog Check to examine for leaks in the fuel tank and vapor lines.

More Stringent Cutpoints

One approach to getting more complete repairs and lower emissions is to increase the stringency of the inspection standards (cutpoints) used to determine if the vehicle initially passes or fails. This measure would set more stringent cutpoints which would ensure more cars would have more complete and durable repairs.

Annual Inspections for Older Vehicles

Vehicles that are 15 years or older have a failure rate that is more than twice the average. This measure would require older vehicles to be tested annually which would shorten the time that they are emitting excess emissions prior to being repaired.

Annual Inspections for High Annual Mileage Vehicles

About 3 percent of cars are driven over 25,000 miles per year. These vehicles fail Smog Check at about twice the average rate. This measure would require high-mileage vehicles to be tested annually which would shorten the time that they are emitting excess emissions prior to being repaired.

Add Visible Smoke Test.
Excess soot from smoking passenger vehicles is estimated at about one and a half tons per day statewide and is a public health concern. An inspection for excessive smoke is currently not part of the Smog Check program, but soon will be due to newly enacted legislation (AB 1870, Lieber, Chapter 761 of 2006) that establishes visible smoke as a cause for Smog Check failure.

Inspection of Light- and Medium-Duty Diesels.
There are over 200,000 diesel passenger cars and trucks in California. While diesel vehicles have low ROG emissions, they emit higher levels of NOx and particulate matter than gasoline vehicles. Diesel vehicles, however, are not currently required to take part in the Smog Check program. This measure would develop a Smog Check inspection program for diesel passenger cars and trucks that would allow identification and repair of high emitting diesel vehicles.

Inspection of Motorcycles.
There are about 400,000 motorcycles registered in California. They are currently exempt from Smog Check. While motorcycles do not have a high rate of emission control deterioration, surveys indicate a high level of exhaust system tampering. This measure would require some form of motorcycle Smog Check inspections to help reduce excess motorcycle emissions.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	245	138	109	98
	Emission reductions:				
	Low Pressure Evaporative Test		**4.1**	**3.2**	**2.2**
	More Stringent Cutpoints		**0.8**	**0.6**	**0.6**
	Annual Inspect Older Vehicles		**3.1**	**2.5**	**2.3**
	Annual Inspection for High Annual Mileage Vehicles		**0.5**	**0.4**	**0.4**
	Inspection of Motorcycles		**2.0**	**2.0**	**2.0**
	Total potential reductions		**10.5**	**8.7**	**7.5**
NOx	Baseline emissions	243	128	88	74
	More Stringent Cutpoints		**2.0**	**1.4**	**1.1**
	Annual Inspect Older Vehicles		**7.2**	**4.9**	**4.2**
	Annual Inspection for High Annual Mileage Vehicles		**1.6**	**1.1**	**0.9**
	Inspection of Light- and Medium-Duty Diesels		**0.6**	**0.3**	**0.1**
	Inspection of Motorcycles		**0.6**	**0.6**	**0.6**
	Total potential reductions		**12.0**	**8.3**	**6.9**
PM2.5	Baseline emissions	6.2	7.8	9.0	9.4
	Add Visible Smoke Test		**0.2**	**0.2**	**0.2**
	Inspection of Light- and Medium-Duty Diesels		**0.02**	**0.01**	**< 0.01**
	Total potential reductions		**0.2**	**0.2**	**0.2**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	77	48	36	34
	Low Pressure Evaporative Test		**0.8**	**0.6**	**0.4**
	More Stringent Cutpoints		**0.2**	**0.2**	**0.2**
	Annual Inspect Older Vehicles		**0.7**	**0.5**	**0.5**
	Annual Inspection for High Annual Mileage Vehicles		**0.2**	**0.1**	**0.1**
	Inspection of Motorcycles		**1.0**	**1.0**	**1.0**
	Total potential reductions		**2.9**	**2.2**	**1.9**
NOx	Baseline emissions	68	40	28	24
	More Stringent Cutpoints		**0.4**	**0.3**	**0.2**
	Annual Inspect Older Vehicles		**1.5**	**1.1**	**0.9**
	Annual Inspection for High Annual Mileage Vehicles		**0.8**	**0.5**	**0.5**
	Inspection of Light- and Medium-Duty Diesels		**0.3**	**0.2**	**0.2**
	Inspection of Motorcycles		**0.3**	**0.3**	**0.3**
	Total potential reductions		**3.3**	**2.4**	**2.1**
PM2.5	Baseline emissions	1.4	1.8	2.1	2.4
	Add Visible Smoke Test		**0.05**	**0.05**	**0.05**
	Inspection of Light- and Medium-Duty Diesels		**< 0.01**	**< 0.01**	**< 0.01**
	Total potential reductions		**0.05**	**0.05**	**0.05**

Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The adjustments include criteria pollutant benefits from the greenhouse gas limits for motor vehicles adopted in 2004 and emission reductions from the Carl Moyer Program.

Baseline emissions are for all light- and medium-duty passenger cars, SUVs and trucks, and all gasoline heavy-duty trucks. Reductions have been estimated in the following manner:

Low Pressure Evaporative Test—ARB staff has estimated the potential emission reductions from the low pressure test using before and after repair data collected by ARB and U.S. EPA.

More Stringent Cutpoints—The reductions are based on more stringent initial inspection standards (cutpoints), taken from a study by Sierra Research using failure rate data collected from the California, Arizona, and Wisconsin inspection programs.

Annual Inspections for Older Vehicles—Staff used the EMFAC emissions model to estimate the emissions reductions of an annual inspection compared to biennial inspection.

Annual Inspections for High Annual Mileage Vehicles—The estimated reductions from 20,000 taxicabs were ratioed to the assumed 3 percent of the enhanced program area fleet driven high mileage. We assumed that one-half of the 3 percent of the fleet that are high annual mileage vehicles would be identified as accruing high annual mileage, tested annually, and repaired, resulting in emission reductions.

Visible Smoke Test—Based on a study by Eastern Research Group, we have estimated that approximately 200,000 smoking gasoline vehicles are driven daily statewide. We are assuming that half of these vehicles would fail the current tailpipe test in Smog Check. We have estimated benefits for the visible smoke test by assuming it would fail 100,000 vehicles per biennial cycle, which equals 50,000 failures per year. Reductions statewide are based on repairing 50,000 vehicles driving 30 miles per day with a 0.25 gram/mile total PM reduction.

Inspection of Motorcycles—Benefits are based on an inspection program less stringent than the current program for gasoline cars and trucks. We are assuming a motorcycle inspection program would get half of the percent reduction in emissions that the current enhanced Smog Check program is achieving.

Timing

Action: 2007-2008
Expected Implementation: 2010

Expanded Passenger Vehicle Retirement

The bulk of emissions from passenger vehicles comes from older vehicles. The Smog Check program helps older California cars run cleaner. To meet clean air goals, however, we need to reduce emissions from these older vehicles even more. Owners of vehicles that fail Smog Check inspections are currently given the option of fixing their vehicles or receiving a monetary incentive for voluntarily retiring them. This measure would expand the Smog Check vehicle retirement program to vehicles that are off-cycle from their Smog Check inspections.

It is estimated that the vehicle retirement program could increase its scope from the current 18,000 vehicles per year statewide to approximately 50,000 per year in the South Coast and 10,000 per year in the San Joaquin Valley, which reflects retiring about half of one percent of vehicles subject to Smog Check in each region. The annual retirement of these vehicles in the South Coast and San Joaquin Valley would result in combined ROG and NOx emissions benefits of 2 percent of passenger vehicle emissions in 2014.

Funding for vehicle retirement at both State and local program levels comes from fees on newer cars exempt from Smog Check. Increasing the scope of the program would require additional State or local funding.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	206	112	86	76
	Potential reductions		**2.8**	**1.2**	**0.5**
NOx	Baseline emissions	204	101	65	53
	Potential reductions		**2.4**	**1.3**	**0.2**
PM2.5	Baseline emissions	9.4	7.7	8.6	9.0
	Potential reductions		**0.05**	**0.06**	**0.06**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	62	37	27	24
	Potential reductions		**0.7**	**0.3**	**0.1**
NOx	Baseline emissions	58	31	19	16
	Potential reductions		**0.5**	**0.3**	**0.04**
PM2.5	Baseline emissions	2.1	1.8	2.0	2.2
	Potential reductions		**0.01**	**0.01**	**0.01**

Baseline emissions include emissions from light- and medium-duty passenger cars, trucks and sport utility vehicles. Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The

adjustments include emission reductions from the Carl Moyer Program and criteria pollutant benefits from the greenhouse gas limits for motor vehicles adopted in 2004.

Emission reductions were estimated assuming a 3-year credit life and that, on average, 16-year-old vehicles will be replaced with 8-year-old vehicles.

Timing

Action: By 2010
Expected Implementation: By 2010

Modifications to Reformulated Gasoline Program

Gasoline fuel combustion is the major source of energy for passenger transportation. Since 1992, ARB has worked to ensure the use of cleaner burning gasoline to improve air quality throughout the state. One of the many components of the most recent gasoline reformulation program, CaRFG3, was the removal of the oxygenate MTBE due to concerns with groundwater contamination. However, the substitute oxygenate, ethanol, has resulted in greatly increased evaporative emissions due to fuel system permeation.

This proposed measure would make modifications to the CaRFG3 program to eliminate or offset all ethanol permeation effects. The effects on ROG emissions from all gasoline-fueled on-road vehicles are estimated to be a 3 percent increase in the South Coast and a 6 percent increase in the San Joaquin Valley. The effects are greater in the San Joaquin Valley due to much higher overall temperatures that affect permeation.

ARB is scheduled to consider modifications to the CaRFG3 program in 2007.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	245	138	109	97
	Potential reductions		**4.4**	**3.0**	**2.5**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	77	48	36	34
	Potential reductions		**2.9**	**1.6**	**1.3**

Baseline emissions are the emissions from all gasoline-fueled on-road vehicles. The estimated reductions are the incremental ROG emissions resulting from ethanol permeation which will be offset by this measure.

Timing

Action: 2007
Expected Implementation: 2008

Cleaner In-Use Heavy-Duty Trucks

Federal and State engine standards will ensure that by 2010 all new diesel heavy-duty trucks are 90 percent cleaner than new 2006 trucks. This tremendous progress is on top of a 65 percent reduction in NOx and an 85 percent reduction in particulate matter since 1990. Since trucks last a long time, we must bring newer trucks into the fleet at a faster pace, clean up older dirtier trucks, and keep the clean trucks clean longer to help meet clean air goals.

This proposed measure is a comprehensive in-use diesel truck emission reduction program estimated to reduce heavy-duty truck NOx emissions 33 percent in the South Coast and San Joaquin Valley by 2014. The measure would accomplish these reductions through a fleet modernization rule and an enhanced screening and repair program.

Fleet modernization

Newer heavy-duty trucks are typically used in long-haul service. After seven or eight years, they are often sold and their service is typically shifted to shorter-haul work. These trucks may remain in service within a given region for another twenty years or more.

A truck fleet modernization measure would focus on overcoming the typically slow rate of heavy-duty truck turnover. The most comprehensive way to accomplish this would be through an in-use fleet rule that would require truck owners to meet specified emission levels and could further target putting new and/or cleaner trucks into regional service within specific nonattainment areas. The proposed measure would also tackle reducing emissions from trucks registered outside of California. While these trucks are typically newer and cleaner, we estimate that they contribute about 25 percent of statewide truck miles on a daily basis. The emission reduction impact of the proposed fleet modernization program would be equivalent to replacing by 2014 approximately 30 percent of the oldest trucks with 2010 models year or newer trucks.

ARB staff has recently begun informational workshops on an in-use heavy-duty truck fleet rule and has started to identify and explore the many emissions inventory, technology, financial, and logistical issues involved in crafting the most effective rule possible. ARB staff will be studying and requesting feedback from stakeholders on many issues, including: the characteristics of trucks registered outside of California; cost implications, especially to truck owner-operators, and ways to avoid any competitive disadvantage for various categories of truck owners; and the most efficient use of limited public incentive funds to achieve maximum emission benefits and lessen financial burden on truck owners.

Excess Emissions Program

An estimate of deterioration of emission controls has historically been built into ARB's projections of future emissions. As new engine technologies are introduced over the next few years, we need to ensure that the complex engine electronics and control devices used to make trucks so much cleaner are not more prone to failure, and deterioration does not reduce some of the benefits of the new standards. It is estimated that about 30 percent of all truck emissions in 2014 will be from control device deterioration, lack of maintenance, and tampering. So, there is a big need for a program to keep these ultra-clean trucks running cleaner longer. The proposed concept needs to be developed into a proposed measure as we develop more data.

Under an existing program, heavy-duty trucks are inspected at random roadside locations to ensure they have the appropriate emission control labels, are tested for excessive smoke, and are inspected for tampered emission control systems. Owners of vehicles that do not pass these inspections are issued citations that require prompt repairs and carry civil penalties. This measure could include an expansion of this program.

While the design and evaluation of the specific program features has yet to be determined, ARB staff estimates that this concept might reduce NOx deterioration emissions by approximately 40 percent by 2014.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	16	10	7	6
	Potential reductions		**5.1**	**2.6**	**1.7**
NOx	Baseline emissions	238	131	79	65
	Potential reductions		**47.3**	**26.9**	**18.3**
PM2.5	Baseline emissions	10.2	5.3	3.3	2.8
	Potential reductions		**3.0**	**1.5**	**1.0**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	20	13	9	8
	Potential reductions		**6.4**	**3.3**	**2.3**
NOx	Baseline emissions	277	150	88	72
	Potential reductions		**61.4**	**30.2**	**21.2**
PM2.5	Baseline emissions	11.4	5.5	3.2	2.6
	Potential reductions		**3.6**	**1.6**	**1.2**

Baseline emissions represent emissions from diesel-fueled medium- and heavy heavy-duty trucks. (Note: Baseline emissions reflect adjustments not included in the SIP Emission Inventory Projections on ARB's website. The adjustments include sleeper truck idling restrictions, diesel engine software upgrade, and emission reductions from the Carl Moyer Program.)

Reductions have been estimated in the following manner:

Emission reductions for fleet modernization were estimated assuming replacement of 30 percent of the oldest, pre-2010 trucks with 2010 model year or newer trucks by 2014. Estimates consider out-of-state truck fleets that are on average newer than in-state fleets. Emission reductions for the excess emissions program were calculated as 50 percent of anticipated deterioration emissions from medium- and heavy heavy-duty diesel trucks.

Timing

Action: 2007-2008
Expected Implementation: 2010-2014

Ships

Auxiliary Engine Cold Ironing and Other Clean Technology Cleaner Main Engines and Fuel

Ships bring the majority of internationally traded goods to California. Due to the international nature of goods movement, marine vessels are subject to international and national standards set by the International Maritime Organization and U.S. EPA. However, ships are historically a largely unregulated sector. In 2006, ship emissions ranked as the largest contributor to SOx emissions, fifth largest contributor to NOx emissions, and seventh largest contributor to directly emitted PM2.5 in the South Coast. With the predicted quadrupling of goods movement through California by 2020 (especially through the Ports of Los Angeles and Long Beach), emissions from ships are expected to increase significantly.

In April 2006, ARB adopted the Emission Reduction Plan for Ports and Goods Movement in California. The plan calls for aggressive measures to reduce emissions from ships and other port-related sources, and ARB has already begun working toward meeting the goals in the goods movement plan. In December 2005, ARB adopted an Auxiliary Engine Fuel Rule that will phase in cleaner low-sulfur fuel from 2007 to 2010. This rule will reduce SOx emissions from auxiliary engines by 96 percent, PM emissions by 83 percent, and NOx emissions by 6 percent beginning in 2010.

The proposed measures outlined below will continue to work toward the goals outlined in the goods movement plan to considerably reduce ship emissions. Marine fuel standards, cold ironing (port electrification), vessel speed reduction, and retrofitted diesel engines will ensure cleaner air around ports and reduced regional emissions. These measures are split by the type of engine used on a ship. Typically, ships use auxiliary engines while they are docked at the port or to run lights and other amenities while they are transiting. Main engines and boilers are used when ships are maneuvering within port waters or transiting throughout open waters.

Auxiliary Engine Measures

In addition to the Auxiliary Engine Fuel Rule, a new proposed measure for reducing auxiliary engines emissions is at-dock modifications including cold ironing and other advanced pollution reduction systems such as the “hood”. Cold ironing allows ships to turn off their auxiliary engines and instead plug into an electrical system for power when they are docked at the port. This is extremely beneficial to surrounding communities as it reduces exposure to multiple pollutants. The “hood” is a device that fits onto a ship’s exhaust stack and cleans the emissions. This measure would phase in the number of ships that will be capable of using cold ironing and technologies such as the “hood”. A combination of cold ironing and other at-dock technologies would reduce SOx

emissions by 54 percent in 2014 and 72 percent in 2023 and both NOx and PM emissions by 65 percent in 2014 and 82 percent in 2023.

Main Engine and Boilers

A Main Engine Fuel Rule, patterned after the Auxiliary Engine Fuel Rule, would help reduce emissions by introducing a cleaner, low-sulfur fuel beginning no later than 2010. This proposed rule would apply to ships using their main engine while maneuvering and transiting near the California coast and would reduce SOx emissions by 96 percent, PM emissions by 83 percent, and NOx emissions by 6 percent no later than 2010.

A highly effective measure to reduce main engine emissions would be to increase the use of cleaner new engines or retrofitted engines. The measure could be implemented via regulation, incentives, voluntary agreements, or a combination of these approaches. By 2014, ships visiting California ports would have either new engines or a mix of retrofit technology (e.g., technology similar to a catalytic converter on a passenger car) that would achieve an overall reduction of NOx and PM of 30 percent. In 2023, ships visiting California would be equipped with an even cleaner technology mix, resulting in a 70 percent reduction of NOx, 50 percent reduction of PM, and 40 percent reduction of SOx.

Vessel Speed Reduction (VSR) is an additional measure that would reduce main engine ship emissions. Presently, ships entering the Ports of Los Angeles and Long Beach have voluntarily agreed to reduce their speed to 12 knots within 24 nautical miles of the ports. It is estimated that there is a 48 percent compliance rate associated with this voluntary measure. In order to further reduce main engine emissions, ARB would require ships to reduce their speeds to 12 knots within 40 nautical miles of the Ports of Los Angeles and Long Beach. The efficacy of the VSR program in reducing emissions changes over time as the vessel speeds are a function of the vessel type. It is estimated that ships will get larger and therefore, their speeds will change. VSR is 30-35 percent effective in reducing SOx emissions, 40-50 percent effective in reducing PM2.5 emissions, and 35-50 percent effective in reducing NOx emissions over time.

Estimated Emission Reductions
(tons per day ship emissions 0-100 nautical miles from the California coast)

South Coast (Auxiliary Engines)*

	(tons per day)	2006	2014	2020	2023
SOx	Baseline emissions	17.2	1.1	1.5	1.8
	Potential reductions	**0.0**	**0.4**	**0.7**	**0.7**
NOx	Baseline emissions	26.6	37.2	48.7	56.3
	Potential reductions	**0.0**	**18.5**	**28.3**	**30.8**
PM2.5	Baseline emissions	2.2	0.6	0.8	0.9
	Potential reductions	**0.0**	**0.3**	**0.4**	**0.5**

*The ARB 2005 Auxiliary Engine Fuel Rule emission reductions are accounted for in the baseline.

South Coast (Main Engines and Boilers)

	(tons per day)	2006	2014	2020	2023
SOx	Baseline emissions	14.7	20.7	26.3	29.7
	Potential reductions	**0.0**	**19.7**	**25.4**	**28.8**
NOx	Baseline emissions	24.4	33.4	41.4	46.3
	Potential reductions	**0.0**	**20.0**	**32.3**	**39.9**
PM2.5	Baseline emissions	1.8	2.6	3.3	3.7
	Potential reductions	**0.0**	**2.4**	**3.1**	**3.6**

Since the control measures apply to the same source, the control percentages were applied sequentially to calculate total reductions.

Timing

Main Engine Fuel ATCM
Action: 2007
Expected Implementation: No later than 2010.

Cold Ironing
Action: 2007
Expected Implementation: Starting in 2010 – 10 percent by 2010, 60 percent by 2014, and 80 percent by 2020.

Cleaner Engines (New and Retrofits)
Action: 2009
Expected Implementation: Phase-in starting in 2010.

Port Truck Modernization

Trucks serving California ports are a vital part of the goods movement system. Trucks transfer incoming cargo containers from the ports to intermodal distribution centers for transport via long-haul rail or truck to their ultimate destination in California or throughout the U.S. Trucks also carry agricultural products from the Central Valley and other farming regions, and exports, to the ports for shipment overseas. Port-related truck activity is growing. The number of containers carried by truck to and from the Ports of Los Angeles and Long Beach, for example, is expected to grow by a factor of 2.5 within twenty years. Because trucks in port service tend to be older and dirtier than the truck fleet as a whole, it is important that the impact of these vehicles be mitigated more quickly to address community health issues and to meet air quality goals.

This proposed measure would reduce NOx and diesel PM2.5 emissions from the existing port truck fleet, as well as additional trucks entering port service. The basis for this strategy closely follows the goals outlined in the Emission Reduction Plan for Ports and Goods Movement in California (April 2006). Rulemaking is currently in progress for the port truck modernization rule, which would take place in two phases.

In the first phase, by 2011, trucks in regular port service that are model year 1993 and older would be replaced with 1998 and newer trucks. In addition, all trucks in regular port service would be retrofitted with verified devices that reduce diesel PM by 85 percent or more. Retrofits that also provide NOx reductions would be used to the greatest extent feasible. The second phase would require pre-2003 trucks in regular port service to meet or exceed 2010 federal engine standards by the end of 2017, and pre-2007 trucks in regular port service to meet or exceed 2010 federal engine standards by the end of 2019. Additionally, the proposal would require trucks entering port service for the first time between 2008 and 2011 to meet or exceed 2003 federal engine standards and be equipped with diesel particulate filters. Trucks entering port service between 2012 and 2014 would need to meet or exceed 2007 federal engine standards, and trucks entering port service in 2015 and later would need to meet or exceed 2010 federal engine standards.

This proposed measure would reduce port truck NOx emissions in the South Coast Air Basin by about 10 percent in 2014 and 50 percent in 2023. Also, diesel PM emissions from port trucks in the South Coast Air Basin would be reduced by more than 50 percent in 2014 and by more than 30 percent in 2023.

The reductions from this measure would complement the reductions achieved by the proposed cleaner in-use heavy-duty truck measure. The regulation currently being developed for port trucks would apply only to those heavy heavy-duty trucks in primary port service. The Private Fleet rule currently under development would provide the reductions cited for the in-use heavy-duty truck

measure by including the heavy heavy-duty trucks not in port service, and all of the medium heavy-duty trucks.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
NOx	Baseline emissions	22	18	15	15
	Potential reductions		**2**	**8**	**7**
PM2.5	Baseline emissions	1.0	0.8	0.6	0.6
	Potential reductions		**0.5**	**0.3**	**0.3**

Baseline emissions are for port trucks, based on inventories developed for the Emission Reduction Plan for Ports and Goods Movement. Emission reduction estimates are based on the assumption that port trucks are older, on average, than the fleet as a whole (age distribution was based on a 2002 study by Starcrest International). The number of trucks in regular port service is projected to grow from approximately 12,000 in 2005 to 15,000 in 2010, 18,000 in 2015 and 21,000 in 2020. Staff assumed that port trucks make trips of lower average speed (35 mph), owing to short hauls to distribution centers and congested conditions near the ports.

Emission reductions were estimated for the San Joaquin Valley but found to be insignificant. Goods movement-related emissions from trucks in the San Joaquin Valley are generated primarily by line-haul trucks and not port trucks. Line-haul truck emissions are significantly reduced in the proposed cleaner, in-use heavy-duty truck measure.

Timing

Action: 2007
Expected Implementation: 2008-2020

Accelerated Introduction of Cleaner Line-Haul Locomotives

Line-haul locomotives used to pull rail cars long distances account for about 95 percent of total train emissions. U.S. EPA is expected to propose new Tier 3 standards that are anticipated to reduce NOx and PM emissions by 90 percent. These emission standards would build on existing federal requirements for using low sulfur diesel fuel by all trains beginning 2012. They would include new engine standards and rebuild standards and are expected to require aftertreatment technology. Since the useful life of a locomotive can exceed 30 years, the accelerated use of Tier 3 or equivalent technology could provide significant diesel PM and NOx reductions. ARB is pushing U.S. EPA to adopt the most stringent standards possible.

The proposed measure calls for replacing existing locomotive engines with Tier 3 engines beginning 2012 and conducting concurrent rebuilds of older engines to Tier 2.5 standards. Each year 10 percent of the existing engines would be replaced by Tier 3 engines and 5 percent upgraded to Tier 2.5 standards until 100 percent of the statewide fleet has been upgraded. All of this can only occur once U.S. EPA adopts Tier 3 engine standards for locomotives. It is estimated that by 2023, this measure would reduce NOx by 70 percent and direct PM2.5 by about 75 percent.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	2.30	2.30	2.4	2.5
	Potential reductions		**0.7**	**1.8**	**1.9**
NOx	Baseline emissions	26.7	18.3	21.0	22.6
	Potential reductions		**4.3**	**13.4**	**15.6**
PM	Baseline emissions	0.78	0.71	0.72	0.75
	Potential reductions		**0.20**	**0.30**	**0.56**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	1.6	1.5	1.6	1.6
	Potential reductions		**0.5**	**1.2**	**1.3**
NOx	Baseline emissions	21.5	19.9	20.6	21.1
	Potential reductions		**7.2**	**15.6**	**16.4**
PM	Baseline emissions	0.58	0.53	0.53	0.54
	Potential reductions		**0.18**	**0.42**	**0.46**

Baseline emissions represent line-haul and switcher locomotives.

Timing

Action: U.S. EPA adopts Tier 3 standards in 2007. Voluntary agreement to accelerate implementation – 2008.

Expected Implementation: Introduction of 10 percent Tier 3 and upgrades to Tier 2.5 at 5 percent are expected to begin 2012.

Clean Up Existing Commercial Harbor Craft

Commercial harbor craft are marine vessels that operate primarily along California's coastline and inland waterways. They include tugboats, work boats, crew/supply boats, ferries, excursion boats, and other harbor vessels. The diesel propulsion and auxiliary engines used on these vessels were built for long life and have essentially uncontrolled emissions.

U.S. EPA adopted harbor craft engine standards that apply to new engines beginning in 2004. The engines meeting the new U.S. EPA standards have roughly 50 percent less NOx than uncontrolled engines. Since the useful life of harbor craft vessels is so long, it will take a long time before emissions can be noticeably reduced from fleet turnover. However, many of these vessels can be repowered with newer, cleaner engines.

There are also emission control technologies, called "add-on" controls or retrofits, that clean engine exhaust and can reduce both NOx and diesel particulate matter (PM). Retrofit control technologies have been shown to dramatically reduce emissions when used with heavy-duty diesel engines in land-based operations and can be adapted to marine applications.

ARB is in the process of developing a regulation that would require owners of existing commercial harbor craft to replace old engines with newer cleaner engines and/or to add emission control technologies that clean up engine exhaust. It would address both propulsion and auxiliary engines. The regulation would take into account the fact that harbor craft vessel types are diverse and may require various combinations of emission reducing strategies and that some vessel configurations may not accommodate retrofits. Fishing boats in particular will be difficult to retrofit and also face difficult economic times. The proposed regulation is one of the measures in ARB's Goods Movement Plan and is scheduled for adoption in 2007. ARB staff estimates that the regulation will reduce ROG, NOx, and PM emissions 25 percent by 2010, 30 percent by 2014, and 40 percent by 2020.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	2.3	1.6	1.3	1.3
	Potential reductions		**0.5**	**0.5**	**0.6**
NOx	Baseline emissions	23.1	15.7	12.7	12.7
	Potential reductions		**4.6**	**5.1**	**5.9**
PM2.5	Baseline emissions	1.1	0.7	0.6	0.6
	Potential reductions		**0.2**	**0.2**	**0.3**

The baseline harbor craft inventory is taken from the Emission Reduction Plan for Ports and Goods Movement, April 2006. Direct PM2.5 numbers reflect diesel PM. Emission reduction estimates assume the regulation will reduce emissions 25 percent by 2010, 30 percent by 2014, and 40 percent by 2020. (Emission reductions were estimated for the San Joaquin Valley but found to be insignificant.)

Timing

Action: 2007
Expected Implementation: 2008-2018

Cleaner In-Use Off-Road Equipment

Emission standards for new off-road diesel engines have become increasingly more stringent over the past decade, ensuring that new construction, mining, industrial and oil drilling equipment become progressively cleaner. However, large diesel off-road equipment with more than 25 horsepower remain in use for long periods of time, sometimes up to 60 years. This long life means that new, lower emitting engines are introduced into fleets relatively slowly with the result that the emission reductions and associated health benefits from these cleaner engines will also be slow to materialize. There are opportunities for significant emission reductions by accelerating the introduction of cleaner engines and emissions control technologies into the statewide fleet.

This proposed measure would require owners of equipment larger than 25 horsepower to meet a stringent average emissions level across all of their equipment. The fleet average approach provides equipment owners flexibility in how they will comply, including: swapping older, dirtier engines with newer, cleaner engines; purchasing newer equipment (with cleaner engines); and adding emission control devices to older engines. Equipment owners could also restrict unnecessary equipment idling.

ARB staff is currently in the process of developing a statewide regulation which could require an initial emissions average to be met, with increasingly lower emissions averages over time. Additional reductions needed in the South Coast to reach attainment could be achieved through regional rulemakings above and beyond the statewide rule. This measure would reduce NOx emissions from large diesel off-road equipment in the South Coast Air Basin by approximately 15 percent in 2014 and by about 25 percent in 2023.

ARB staff began work on an in-use off-road equipment rule in 2004 as part of the Diesel Risk Reduction Program. During early SIP development work in 2006, staff identified the need for large NOx emission reductions from off-road equipment and other diesel sources to meet the health-based federal air quality standards. Consequently, staff revised the control concept extensively to meet California's clean air needs relative to diesel particulates, ozone, and PM2.5.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	20.0	13.1	9.2	8.0
	Potential Reductions		**2.2**	**2.1**	**2.0**
NOx	Baseline Emissions	141.7	94.8	58.1	45.7
	Potential Reductions		**13.8**	**13.2**	**12.2**
PM2.5	Baseline Emissions	8.0	4.8	2.6	1.8
	Potential Reductions		**2.5**	**1.7**	**1.5**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	6.1	4.2	3.1	2.7
	Potential Reductions		**0.8**	**0.8**	**0.8**
NOx	Baseline Emissions	47.6	32.8	21.6	17.7
	Potential Reductions		**4.8**	**4.9**	**4.7**
PM2.5	Baseline Emissions	2.3	1.5	0.8	0.6
	Potential Reductions		**0.8**	**0.6**	**0.5**

Baseline emissions are the same inventory being used in ARB's current rulemaking process.

Emission reduction estimates are based on expected emission reductions from ARB's proposed In-Use Off-Road Diesel Vehicle rule currently under development. Although restrictions on unnecessary idling are included in the proposed rule, emission reductions from the idling restrictions have not been adequately characterized and therefore are not included in the estimated reductions above. Because the proposed rule is under development, the estimated reductions are subject to change.

The emission reduction estimate calculated what the emissions reductions would be if most of the oldest, dirtiest engines were replaced by new, cleaner engines. (However, the means for achieving the reductions are left to the equipment owners to decide.) Because the proposed rule would be fully implemented in 2020, emission reduction estimates for 2023 were calculated by assuming the same level of control in 2023 as was realized in 2020.

Timing

Action: 2007
Expected Implementation: Phase-in starting 2008

Cleaner In-Use Agricultural Equipment

New engines used in agricultural operations must meet the same standards as other off-road engines, ensuring that new equipment become progressively cleaner. Just as in other off-road applications, diesel agricultural equipment can remain in use for long periods of time. This long life means that new, lower emitting engines are introduced into fleets relatively slowly with a direct impact on the pace that emission reductions materialize.

The cleanup of agricultural in-use equipment is primarily an issue in the San Joaquin Valley with its large agricultural economy. Natural turnover of the agricultural fleet will reduce emission significantly by the Valley's expected 2024 ozone attainment deadline. Modeling for the Valley's PM2.5 SIP due in 2008 will show what accelerated fleet modernization may be needed. Once that information is available, ARB staff will quantify reductions from this measure. ARB staff is also supporting efforts to obtain additional incentive funding to accelerate progress, and will assess a modernization program as part of its development of long-term concepts for ozone attainment.

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	13	7	4	3
	Potential Reductions				
NOx	Baseline Emissions	62	38	23	18
	Potential Reductions				
PM2.5	Baseline Emissions	3.5	2.0	1.1	0.7
	Potential Reductions				

New Emission Standards for Recreational Boats

Recreational boat engines are broadly divided into two categories: outboard boats/personal water craft (PWC) and inboard/sterndrive. Outboard and PWC motors until recently were predominantly 2-stroke engines. Inboard/sterndrive engines are typically automotive spark-ignition engines adapted for boats that must now comply with a 5.0 g/kW-hr exhaust standard by 2009, which can be achieved with three-way catalytic converters and oxygen sensor feedback controls. Although ARB previously adopted exhaust emission standards for outboard/PWC engines, lower exhaust standards to further reduce emissions are possible by adapting the emission control technology used for inboard/sterndrive engines. This measure calls for the implementation of a tighter, catalyst-based exhaust standard of 5.0 g/kW-hr for outboard/PWC engines to be phased-in beginning in 2013. Only 4-stroke engines are expected to be able to comply with this tighter standard.

Evaporative emissions represent about one fourth of the total ROG emissions from recreational boat engines. (There are no state or federal evaporative emission standards for any type of recreational boats.) This measure also calls for an evaporative emission standard that will address all sources of boat evaporative emissions (tank, carbon canisters, fuel lines, etc.). The technology needed to achieve evaporative standards for boats is readily adaptable from that used in automobiles and small off-road equipment.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	55.6	45.1	42.6	43.0
	Potential Reductions		**4.2**	**12.8**	**17.7**
NOx	Baseline Emissions	3.1	4.2	5.2	5.7
	Potential Reductions		**0.4**	**1.6**	**2.4**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline Emissions	15.8	13.2	12.8	13.1
	Potential Reductions		**1.2**	**3.8**	**5.3**
NOx	Baseline Emissions	0.8	1.1	1.4	1.5
	Potential Reductions		**0.1**	**0.4**	**0.6**

The baseline estimates are comprised of summer average exhaust and evaporative emissions for outboard boats and personal watercraft from the OFFROAD2007 model.

Exhaust emission reduction estimates are based on the percent reduction estimates from ARB's 2001 regulation for inboard/sterndrive engines, which reduced the exhaust standards by the same increment (from 16 to 5 g/kW-hr).

Evaporative emission reductions are based on an estimated 70 percent control of evaporative emissions for all recreational boats of model year 2012 and newer.

Timing

Action: Exhaust standard by 2010; evaporative standard by 2009.
Expected Implementation: Exhaust standard by 2013; evaporative standard by 2012.

Off-Road Recreational Vehicle Expanded Emission Standards

Exhaust Standards

ARB has controlled exhaust emissions from off-road recreational vehicles to a much lesser extent than on-road motorcycles or on-road cars and trucks with the result that off-highway recreational vehicle emissions are projected to increase contrary to the emission trends for other motor vehicles.

In 1994, ARB approved exhaust emission standards and test procedures for off-road recreational vehicles, including off-highway motorcycles and all terrain vehicles (ATVs). In 1998, ARB revised the rules to allow non-compliant vehicles to be sold and operated either annually or seasonally depending on local area ozone levels.

Off-road recreational vehicles have not achieved their potential exhaust emission reductions as technical issues, cost, and tampering difficulties have limited exhaust emission reductions. Another concern is that the California market is not large enough for off-road recreational vehicle manufacturers to justify producing vehicles that would comply with more stringent California exhaust standards. The likely result could be that consumers either purchase off-road recreational vehicles out-of-state or falsely certify that the vehicles they purchase are intended for use in competition. The most effective strategy would be for U.S. EPA to establish tighter exhaust standards for all off-road recreational vehicles, thereby precluding the potential for California consumers to purchase and operate non-complying (and higher emitting) vehicles.

This measure calls for reducing exhaust emissions by 50 percent from new off-highway motorcycles and ATVs beginning in 2012 using proven automotive and on-road motorcycle exhaust emission reduction technologies. ARB staff estimates that the regulation will reduce total ROG exhaust emissions from off-road recreational vehicles by 21 percent by 2014 and 38 percent by 2023.

Evaporative Standards

In 2002, U.S. EPA approved a rule that required all off-road recreational vehicles to comply with evaporative standards beginning with 2008 vehicles. However, the standards only control permeation from the fuel tank and hoses. In July 2006, ARB approved evaporative emission standards that harmonized with existing U.S. EPA regulations.

This measure will reduce ROG evaporative emissions by 50 percent from off-highway motorcycles and ATVs beginning in 2012 using proven automotive and on-road motorcycle evaporative emission reduction technologies. With Board adoption by 2009, ARB staff estimates that the regulation will reduce ROG evaporative emissions by 7 percent by 2014 and 12 percent by 2023.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	23	28	32	35
	Potential reductions		**7.8**	**14.5**	**17.4**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	6	8	9	10
	Potential reductions		**2.2**	**4.0**	**4.8**

Baseline emissions (exhaust + evaporative) are for all off-road motorcycle and ATVs in each region. Emission reduction estimates are from ARB's off-road motor vehicle emissions model programmed to calculate the potential impact of reducing new engine exhaust emissions by 50 percent beginning in 2012.

Timing

Action: By 2010
Expected Implementation: By 2012-2014

Portable Outboard Marine Tank Evaporative Standards

Portable outboard marine tanks (OMT) are small-capacity tanks (usually less than 12 gallons) that supply fuel to marine outboard engines. Unlike larger vessels with permanently mounted fuel tanks, many small and medium size outboard boats use removable tanks to allow both the engine and fuel tank to be removed for transport or storage. OMTs are not subject to any emission standards and as a result have relatively high evaporative emissions. DMV and other data indicate that there were approximately 200,000 registered outboard vessel owners in California in 2005. If we assume one tank per outboard, the statewide inventory would be 200,000 OMTs with statewide emissions of approximately six tons per day. The emissions for the South Coast, estimated at 2.4 tons per day (40 percent of statewide totals), were scaled from the ratio of the statewide inventory for outboard boat engines of 10 or less horsepower to the South Coast inventory of similar boats.

Diurnal and permeation standards for OMTs and associated equipment with approximately the same emission reduction efficiency as required by ARB's 2005 regulation for portable fuel containers would reduce emissions by 50 percent in 2014 and 75 percent in 2023.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	2.6	3.6	4.7	5.3
	Potential reductions	--	**1.8**	**2.9**	**4.0**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	0.6	0.7	0.8	0.9
	Potential reductions	--	**0.4**	**0.5**	**0.7**

Timing

Action: 2007
Expected Implementation: 2010

Refueling Gasoline Tank Evaporative Standards

Refueling gasoline tanks (from 30 to 100 gallons) are usually mounted on a vehicle and used to refuel other motor vehicles. Some examples include tanks on recreational vehicles, like toy haulers, for fueling off-highway recreational vehicles or tanks on pickup trucks for fueling off-road or agricultural equipment. There are an estimated 150,000 refueling tanks in California. Evaporative emissions from refueling tanks include standing or storage loss emissions, working loss emissions, and permeation emissions from hoses.

ARB staff are currently conducting surveys to determine accurate populations as well as testing to calculate more accurate emissions. Rough preliminary statewide estimates of evaporative emissions from refueling gasoline tanks are approximately six tons per day. Setting evaporative standards for refueling tanks would reduce ROG emissions by 60-70 percent, depending on which technology is utilized. Control technologies being considered include passive purge carbon canisters and insulation.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	2.3	2.7	3.20	3.5
	Potential reductions	**--**	**1.6**	**1.9**	**2.1**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	0.8	0.9	1.1	1.2
	Potential reductions	**--**	**0.5**	**0.7**	**0.7**

Baseline emission numbers are the statewide inventory for refueling tanks scaled to regions based on the percentage of recreational vehicles. Potential reductions are based on 60 percent control expected to be achieved through control technology.

Timing

Action: 2008
Expected Implementation: 2010

Gas Station Refueling Hose Evaporative Standards

Gas station refueling hoses are co-axial hoses that transfer fuel from the filling station pump to a vehicle's fuel tank and return displaced gasoline vapors from the vehicle fuel tank to the gasoline storage tank. Evaporative emissions occur during the fueling process through the hose material. There are an estimated 150,000 gas station refueling hoses statewide with estimated emissions of four tons per day.

Setting evaporative standards for gas station refueling hoses would reduce ROG emissions by 70-98 percent, depending on which technology is utilized. These estimates are based on previous standards for low permeation vehicle fuel hose and initial ARB and industry testing results.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	2.0	2.2	2.3	2.4
	Potential reductions	**--**	**1.5**	**1.6**	**1.7**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	0.2	0.3	0.4	0.4
	Potential reductions	**--**	**0.2**	**0.2**	**0.3**

Statewide

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	4.1	4.5	4.9	5.0
	Potential reductions	**--**	**3.2**	**3.4**	**3.5**

Baseline emissions are the statewide emissions inventory for gas station refueling hoses, scaled to regions based on the percentage of vehicle refueling emissions. Potential reductions are based on 70 percent control achieved through control technology.

Timing

Action: 2008
Expected Implementation: By 2012

Enhanced Vapor Recovery for Above Ground Storage Tanks

Above ground storage tanks are large gasoline storage tanks used extensively in agricultural operations. Typical tanks have capacities ranging from 250 to 12,000 gallons. Above ground storage tanks are becoming increasingly popular due to their superior leak detection capabilities. Because these tanks are exposed to ambient air temperatures, emissions are greater than from underground tanks. Annual statewide ROG emissions from all tanks in 2004 totaled 3.1 tons per day. Emission reductions are possible and feasible with an enhanced vapor recovery certification process and new performance standards and specifications.

This proposed measure calls for reducing emissions by 90 percent from new above ground storage tanks by 76 percent from retrofitting existing non-agricultural tanks and by 60 percent from retrofitting existing agricultural tanks. This measure would be implemented beginning in 2007 and by 2011 would reduce statewide ROG emissions from tanks by two tons per day. ARB staff is currently analyzing what the emission reductions would be for each region.

Estimated Emission Reductions

Statewide

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	3.2	3.5	3.8	3.9
	Potential reductions	**--**	**2.3**	**2.4**	**2.4**

Timing

Action: 2007
Implementation: Phase-in starting 2007

Consumer Products Program

Chemically formulated consumer products such as automotive care products, household care products, and personal care products have been regulated as a source of ROG emissions in five rulemakings since 1989. As a result of these measures, statewide emissions from consumer products will be reduced by over 170 tons per day in 2010, a 40 percent reduction. Despite this progress, population growth in the years ahead is expected to reverse the downward trend of emissions from consumer products as early as 2008, after the latest standards become effective. Even though the average photochemical reactivity of the ROG emissions from the consumer product sector is approximately one-third that of motor vehicle exhaust, the magnitude of emissions from this sector indicates that additional controls for this sector will remain important. Consumer products are expected to become the largest source of ROG emissions in the South Coast Air Basin, and the third largest source in the San Joaquin Valley Air Basin by 2020**.**

This proposed measure would continue ARB's commitment to reduce ROG emissions from consumer products. The current program uses industry surveys to gather information about sales trends and product formulations. Staff uses survey data along with trade journals, patents, and other technical information to propose mass-based ROG limits. Staff will continue to investigate any and all opportunities for emission reductions from mass-based limits by taking advantage of emerging low-emitting technologies. However, the ability to achieve significant reduction from mass-based standards is waning, so staff will likely be shifting the focus to other potential emission reduction opportunities. One such measure would include investigating emission reduction opportunities through reactivity-based standards in most categories. A reactivity-based approach relies on the scientific principle that different chemical compounds form different amounts of ozone in the atmosphere, rather than the mass-based approach that reduces ozone formation by reducing all volatile organic compounds.

In the future, it is likely that further emission reductions from the consumer products source category will not be feasible using conventional approaches. We will work with stakeholders to explore alternative market-based mechanisms that would encourage the development, distribution, and purchase of cleaner, very low, or zero emitting products. Examples of mechanisms to explore are a multi-media labeling program, programs where companies set their own emissions reduction goals, and the use of the media for public education. If these mechanisms cannot produce meaningful emission reductions from the consumer products source category, then other approaches would be evaluated. Examples of alternative approaches are the purchase of ROG credits and the funding of special projects to reduce emissions or accelerate reductions from pollution sources outside of the consumer products industry.

The above approaches could be implemented through several rulemakings and would achieve approximately 30-40 tons per day ROG reductions statewide, equivalent to 13-17 tons per day in the South Coast, in the 2008 to 2014 timeframe. The 2006 measure was adopted by the ARB Board in November 2006 with phase-in implementation from 2008 to 2010.

Estimated Emission Reductions

South Coast

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	103.42	102.63	107.38	109.54
	Potential reductions	--	**12.9**	**13.5**	**13.7**

San Joaquin Valley

	(tons per day)	2006	2014	2020	2023
ROG	Baseline emissions	23.58	25.52	28.38	29.89
	Potential reductions	--	**3.2**	**3.6**	**3.8**

Timing

Consumer Products Regulations

Action: 2007-2008
Expected Implementation: By 2010

Action: Between 2010 and 2012
Expected Implementation: By 2012-2014

Department of Pesticide Regulation's 2008 Pesticide Plan

The Department of Pesticide Regulation's (DPR) 2008 Pesticide Plan is a strategy to reduce ROG emissions from pesticides through enforceable regulations that prohibit high emission practices and by requiring products that contribute less to ozone formation. The regulatory efforts will be supplemented by an overall strategy to reduce the reliance on pesticides and the promotion of low emission technologies.

A major regulatory component will involve the reduction in emissions from fumigants. Fumigants account for about one-fourth of all pesticide pounds applied annually. In 2008, DPR will implement regulations that require use of low-emission practices for field fumigation, such as deep injection, tarping, irrigation, and application through drip irrigation systems, as appropriate. In addition, DPR will utilize the regulatory structure established by these field fumigation regulations to achieve further emission reductions in subsequent years as appropriate. Also, regulations will be enacted in the future to eliminate 90 percent of the emissions from agricultural and non-agricultural practices such as those in chambers and structural settings.

Regarding other pesticide products, specifically liquid emulsifiable concentrates, in 2005 DPR initiated an effort to reformulate pesticide products to reduce their smog forming potential, pursuant to its authority to reevaluate current product registrations. This reevaluation will continue as part of the 2008 Plan.

While the Pesticide Plan will be implemented statewide, the resulting reductions will vary in different areas. Only certain air quality management areas will rely on reductions from the Pesticide Plan. For example, current rough estimates indicate that the initial field fumigation regulations would result in between four and five tons per day reduction in ROG emissions in the San Joaquin Valley area. Estimated reductions will be refined and will likely change once the proposed regulation package is complete. DPR will account for the reductions from reformulation, any further field fumigation regulation and chamber fumigation regulation in the future.

DPR's 2008 Plan will be supplemented by a strategy that promotes the use of innovative technologies and integrated pest management systems that will result in lower emissions from pesticides. DPR will look for opportunities to build strategic partnerships with the agricultural, pest control and research communities to explore new ROG reduction opportunities. DPR will track and account for reductions achieved through such efforts as those programs develop.

(This page intentionally left blank.)

5. REGIONAL SIP SUMMARIES

San Joaquin Valley Air Basin

Overview

The San Joaquin Valley Air Basin (Valley) is one of the fastest growing regions in California and is home to more than 3.6 million people. The Valley has ozone levels nearly 35 percent above the federal standard which make it among the most heavily impacted regions in the nation. The Valley is currently classified as serious nonattainment for the federal 8-hour ozone standard, as well as nonattainment for the federal PM2.5 standard. The San Joaquin Valley Air Pollution Control District (District) released a draft plan for attainment of the ozone standard in October 2006. The combined local measures and State Strategy will provide progress towards attainment of both the ozone and PM2.5 standards. However, because we do not yet have carrying capacities from the particulate modeling for the Valley, we may need to revisit the Strategy over the next few months as the District develops its PM2.5 attainment plan.

Preliminary modeling indicates that attainment of the ozone standard in the Valley is heavily dependent on control of nitrogen oxides (NOx) emissions and that NOx emissions must be reduced by 75 percent from today's levels in order for the region to reach attainment of the standard. Reducing reactive organic gases (ROG) will also help to reduce ozone, especially in the near-term. Air quality modeling indicates that while important, ROG emission reductions do not have the same relative benefit as NOx emission reductions. In order to demonstrate attainment of the 8-hour ozone standard by the June 15, 2013, nominal attainment date, all of the emission reductions needed for attainment must be in place by the beginning of the ozone season in 2012.

California's existing air pollution control program is already providing reductions of the ozone precursors. The current control programs will provide a 27 percent reduction in NOx and a 9 percent reduction in ROG emissions between now and 2012 in the Valley. To attain the standard in 2012, the Valley would need to have further NOx reductions of more than 66 percent. Clearly, demonstrating attainment of the federal ozone standard by June 2013 as a serious nonattainment area is not a viable option. The Clean Air Act (Act) allows, and the U.S. Environmental Protection Agency (U.S. EPA) recommends, that in these cases the area be reclassified to an appropriate higher classification such as severe-15, severe-17, or extreme with attainment dates in 2019, 2021, and 2024, respectively.

ARB staff believes that an extreme classification is the Valley's only realistic option. If the Valley were to bump up to severe-17, the emission reductions needed to attain in 2021 would still exceed all of the reductions identified to date by more than 100 tons per day of NOx – despite the very aggressive State

Strategy being proposed here. The Valley faces a fundamental technology constraint in its effort to attain the federal ozone standard. As discussed later in this section, even if every car, truck, and piece of construction and farm equipment met the cleanest adopted emission standards, the Valley would still be unable to attain by 2021.

With a 2024 attainment deadline, the majority of the emission reductions needed to bring the Valley into attainment will come from the implementation of the existing State mobile source control program, as newer and cleaner equipment and vehicles become available. However, additional reductions will still be needed. The ARB and District staffs have identified additional opportunities to garner further reductions. The State Strategy proposed in this document proposes significant additional mobile source emission reductions in the Valley on a very aggressive timeline. The San Joaquin Valley District staff is also proposing additional controls on stationary and area-wide sources. Both the State and the local proposals include innovative emission reduction strategies, including regulations, incentive programs, and alternative compliance programs. While the combined existing program and new measures provide significant progress, more reductions are needed to get the entire Valley to attainment of the ozone standard. Therefore, the ARB and the District will need to continue to develop longer-term concepts to provide the final increment of reductions needed for the Valley to attain the standard.

The focus of the current planning effort for the San Joaquin Valley is ozone, but it is important to remember that the Valley is also classified as nonattainment for the federal PM2.5 standard. The Valley now has a nominal attainment date for the PM2.5 standard of April 2010, with a maximum extension to 2015. The PM2.5 attainment plan must be submitted to U.S. EPA by April 5, 2008. As discussed below, many of the control strategies needed to bring the Valley into attainment of the federal ozone standard will also provide progress towards attainment of the PM2.5 standard. Like the 8-hour ozone standard, U.S. EPA guidance requires all of the emission reductions needed to attain the PM2.5 standard to be in place by the beginning of the year prior to the attainment year, in this case 2014 if the extension is granted. The District will adopt a PM2.5 attainment plan in the first half of 2008. As part of this effort, ARB staff will work with the District to both identify emission reduction targets for attainment and to ensure the Valley comes into attainment with the fine particulate standard as expeditiously as practicable.

Topography and Meteorology

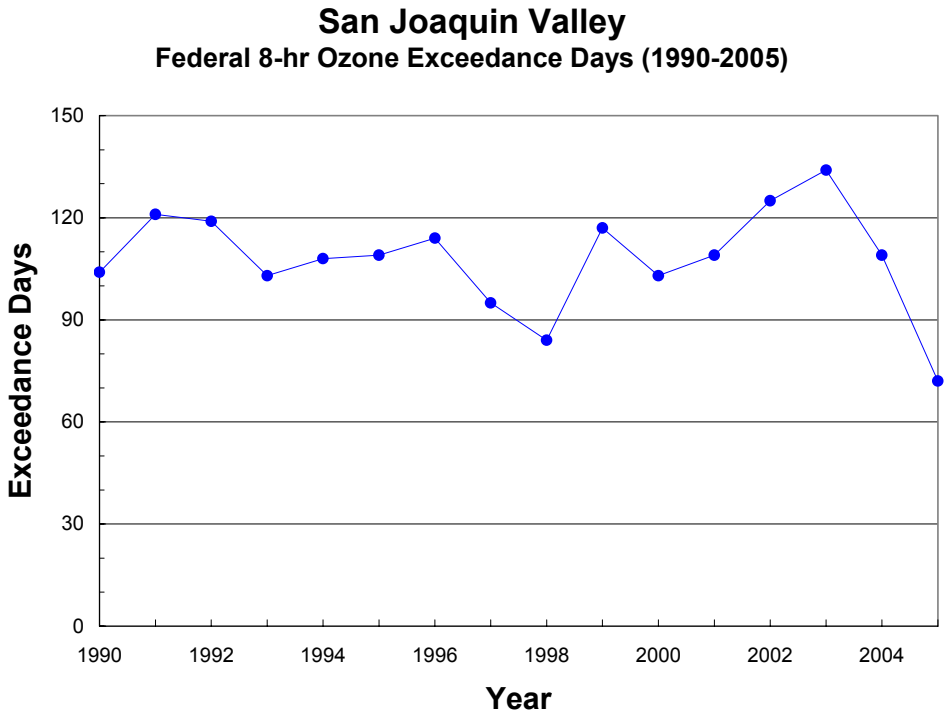
The San Joaquin Valley is the southern half of the Great Central Valley, one of the dominant features in California's landscape. Open to the Sacramento-San Joaquin River Delta in the north, the San Joaquin Valley is surrounded by the Sierra Nevada Mountains to the east, the Pacific Coast Range to the west, and the Tehachapi Mountains to the south. Airflow patterns in the San Joaquin

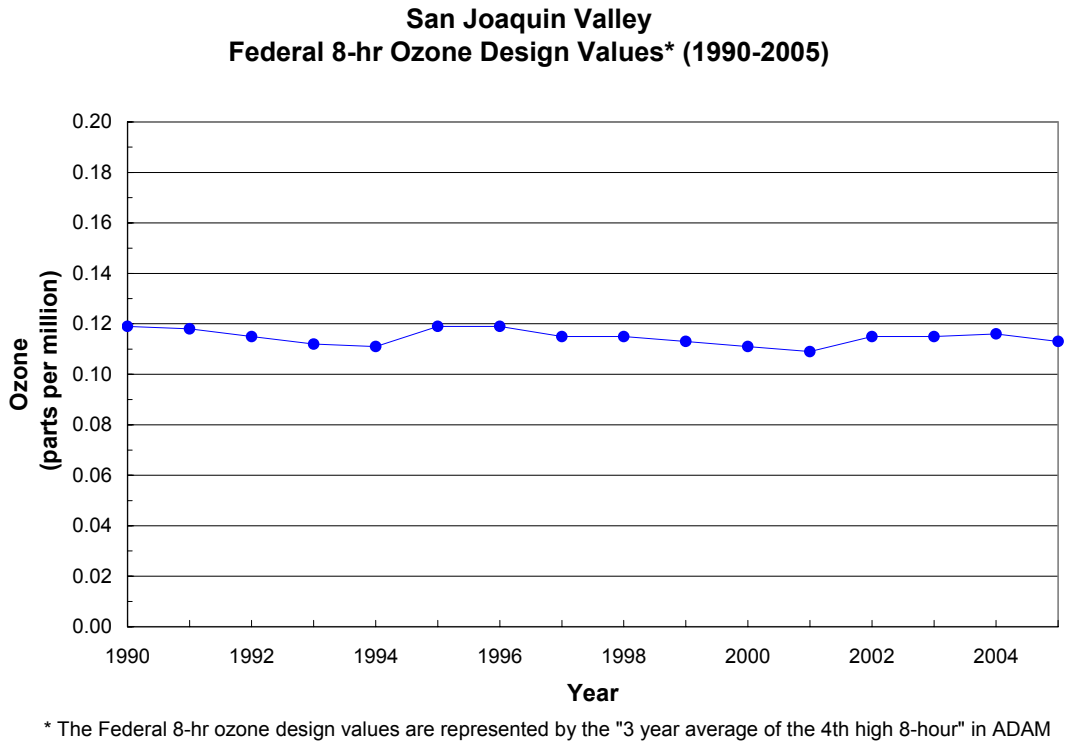
Valley tend to move from north to south and are dammed by the surrounding mountain ranges.

The climate and geography of the San Joaquin Valley create the optimal conditions for creating and trapping air pollution. The Valley is characterized by hot, dry summers, with normal temperatures in the nineties, and heat waves periodically exceeding 100 degrees Fahrenheit. Winters in the San Joaquin Valley are cool and damp, with frequent periods of dense fog. In both summer and winter, the major airflow patterns tend to result in long mixing times for emitted pollutants, especially in the central and southern portions of the Valley. These stagnant weather patterns make the Valley vulnerable to forming ozone and fine particulate matter air pollution and impede the region's ability to disperse it. The ozone season in the San Joaquin Valley spans a six-month period—May through October. Approximately two out of every three days in this period has an exceedance of the national ozone standard at one or more sites within the Basin—reflecting the challenge of attaining the standard throughout the Valley.

Current Air Quality

Unlike many other ozone nonattainment areas of the State, the ozone problem in the San Joaquin Valley is not dominated by one large urban area. Instead, it comprises a number of moderately sized population centers, located along the main, northwest-southeast axis of the Valley. Trends for 8-hour ozone levels for the San Joaquin Valley as whole have been strikingly flat over the last 10 years. While the number of days exceeding the federal 8-hour ozone standard has declined more than 30 percent between 1995 and 2005, the federal 8-hour design value has dropped by only 5 percent (see the tables below).





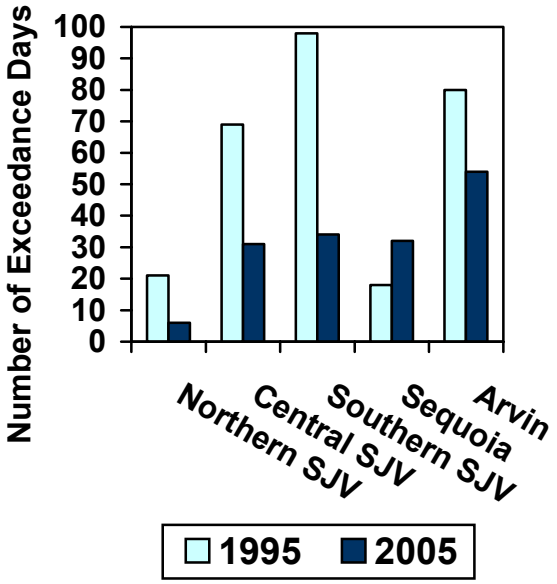
* The Federal 8-hr ozone design values are represented by the "3 year average of the 4th high 8-hour" in ADAM

Because the Valley encompasses a very large geographic area, looking at sub-regions with more similar geography and weather conditions help provide a better understanding of air quality improvements and challenges. Generally, the

number of days exceeding the 8-hour standard is low in the northern region, but dramatically increases from the central to the southern region of the San Joaquin Valley. High ozone concentrations are widespread and commonly occur in the urbanized Merced, Fresno, and Bakersfield regions, and as well as in the downwind areas of Parlier, Sequoia National Park, and Arvin.

Air quality has improved in the Fresno and Bakersfield urban areas. Generally, concentrations are decreasing, with fewer unhealthy days during the ozone season that exceed the federal standard in 2005 as compared to 1995. In 2005, the Central part of the Valley exceeded the standard on 31 days. The Southern part of the Valley exceeded the standard on 34 days (see table below).

8-hour Ozone Exceedance Days



Ozone exceedances in downwind areas such as Arvin and Sequoia National Park are a special concern. Arvin, a community of 15,000 people southeast of Bakersfield and at the foot of the Tehachapi Mountains, was the San Joaquin Valley's design site for 2005, with a design value of 0.113 parts per million (ppm), over 35 percent above the level of the standard of 0.084 ppm. Generally, the number of exceedance days at Arvin surpasses any other site in the San Joaquin Valley with the possible exception of sites located in Sequoia National Park, downwind of the Fresno area. The air quality monitor in Arvin records an exceedance 85 percent of the time when there is an exceedance anywhere in the San Joaquin Valley.

Air quality planning in the San Joaquin Valley is further complicated because the Valley is also designated nonattainment for the federal PM2.5 standard. PM2.5 tends to be high during the wintertime. While the Valley does currently meet the 24-hour PM2.5 standard of 65 ug/m3, the design value for the annual PM2.5

standard is approximately 25 percent above the standard of 15 ug/m3. Attainment of the annual standard is the most significant near-term challenge in the San Joaquin Valley. In addition, the Valley has a significant number of days above the new 24-hour standard of 35 ug/m3, which became effective at the end of 2006 and will be the subject of a future planning cycle.

Emission Inventory

Emission sources in the San Joaquin Valley are diverse. The San Joaquin Valley is an important transportation corridor for moving goods and people inside the State and beyond. In addition, it is one of the most productive agricultural regions in the world as well as home to industrial and commercial activities. All of these sources contribute to the concentrations of pollutants in the Valley. The table below shows the San Joaquin Valley's ozone precursor emission split by source category.

Baseline Emission Trends

(San Joaquin Valley Air Basin, in summer planning tons per day)

Source Category	ROG			NOx		
	2006	2023	% Change	2006	2023	% Change
Stationary & Area-wide[1]	279	314	+12%	128	116	-10%
On-Road Mobile Vehicles[2]	99	42	-58%	361	105	-71%
Off-Road Vehicles and Equipment[2]	74	59	-21%	161	80	-50%
Total[3]	452	414	-8%	650	300	54%

1 – Baseline emissions with SJV Controls Measures adopted through 2006.
2 – State Measures adopted through 2006.
3 – Numbers may not add up exactly due to rounding.

Mobile sources, including commercial trucks, passenger vehicles, tractors and construction equipment account for nearly 80 percent of the NOx emissions in the San Joaquin Valley. Of this, commercial trucks are the leading source, accounting for 45 percent of the total NOx emissions Valley-wide. Passenger vehicles, the number two source, accounted for 9 percent of the total NOx emissions in the San Joaquin Valley. The future year emission inventory projections show reductions are expected to occur due to the existing emission control programs. The following table shows the top 25 sources of NOx emissions in the San Joaquin Valley.

Top 25 NOx Emission Sources

(San Joaquin Valley Air Basin, in summer planning tons per day)

Source Category	2006	2015	2023
HEAVY DUTY DIESEL TRUCKS	285	141	75
FARM EQUIPMENT (COMBINES AND TRACTORS)	60	34	17
PASSENGER VEHICLES	58	28	16
Light Trucks, Minivans and SUVs	*<27*	*13*	*<8*
Passenger Cars	*<20*	*<9*	*<5*
Medium Duty Trucks	*12*	*<7*	*<4*
MANUFACTURING AND INDUSTRIAL (BOILERS, IC ENGINES)	39	44	48
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	35	20	12
OFF-ROAD EQUIPMENT (OTHER)	34	21	15
Oil Drilling and Workover Rigs	*21*	*13*	*8*
Industrial Equipment	*<4*	*<2*	*<1*
Transport Refrigeration Units	*3*	*<4*	*4*
Commercial	*<3*	*<2*	*1*
Cargo Handling Equipment	*<1*	*<1*	*<1*
Airport Ground Support Equipment	*<1*	*<1*	*<1*
Other	*<3*	*<2*	*<1*
LOCOMOTIVES	22	21	22
AGRICULTURAL IRRIGATION PUMPS	16	5	5
OIL AND GAS PRODUCTION (COMBUSTION)	11	10	10
COGENERATION (ELECTRICITY GENERATION AND HEAT RECOVERY)	9	8	8
GASOLINE-FUELED COMMERCIAL TRUCKS	9	7	6
FOOD AND AGRICULTURE (CROP PROCESSING AND WINERIES)	9	9	9
GLASS AND RELATED PRODUCTS	8	9	11
RECREATIONAL BOATS	5	6	6
Pleasure Boats	*<5*	*5*	*5*
Personal Water Craft	*<1*	*1*	*1*
AG BURNING	5	5	5
SERVICE AND COMMERCIAL (BOILERS, IC ENGINES)	4	5	5
PRESCRIBED BURNING	3	3	3
ELECTRIC UTILITIES	3	3	4
AIRCRAFT	3	5	5
RESIDENTIAL FUEL COMBUSTION	3	3	3
Water Heating	*1*	*1*	*1*
Space Heating	*<1*	*<1*	*<1*
Cooking	*<1*	*<1*	*<1*
Other (Clothes Dryers, BBQs, Pool Heaters and Fireplaces)	*<1*	*<1*	*<1*
PUBIC TRANSIT BUSES	2	3	3
SCHOOL BUSES	2	2	2
MINERAL PROCESSES (MINING, CEMENT MANUFACTURING)	2	3	3
OTHER (FUEL COMBUSTION)	2	1	1
MOTORCYCLES	1	1	2
All other sources	17	6	6

Note: Due to rounding, subcategory emission sums may not match the listed total for the category.

TOTAL	**650**	**404**	**300**
Subtotal: On-Road Mobile Sources	*361*	*185*	*105*
Subtotal: Off-Road Mobile Sources	*161*	*109*	*80*

Emission sources of ROG are more diverse. Of the top 25 ROG sources in the San Joaquin Valley (see the table on the next page), only two individual categories are larger than 10 percent of the total inventory – passenger vehicles and composting currently account for 14 percent and 13 percent, respectively. All other ROG sources, including livestock waste, prescribed burning, oil and gas production, and recreational boats make up less than 10 percent when viewed individually.

Anthropogenic, stationary and area-wide sources make up nearly 60 percent of the total ROG emissions, and on-road mobile sources make up one-quarter of the ROG emissions. The balance is made up of off-road mobile sources such as construction and farming equipment. Emissions from stationary and area-wide sources are expected to grow in the future – emissions from waste disposal and composting are expected to increase by more than 20 tons per day between now and 2023.

Top 25 ROG Emission Sources

(San Joaquin Valley Air Basin, in summer planning tons per day)

Source Category	2006	2015	2023
PASSENGER VEHICLES	62	35	24
Passenger Cars	*<29*	*13*	*8*
Light Trucks, Minivans and SUVs	*<26*	*16*	*11*
Medium Duty Trucks	*8*	*6*	*5*
WASTE DISPOSAL/COMPOSTING	57	71	80
LIVESTOCK WASTE (DAIRY CATTLE)	40	33	41
OIL AND GAS PRODUCTION (EVAPORATIVE LOSSES/FLARING)	28	25	23
CONSUMER PRODUCTS	24	26	30
PESTICIDES	23	21	21
HEAVY DUTY DIESEL TRUCKS	20	12	8
RECREATIONAL BOATS	20	17	17
Pleasure Boats	*16*	*14*	*14*
Personal Water Craft	*4*	*3*	*3*
FOOD AND AGRICULTURE (CROP PROCESSING AND WINERIES)	13	12	13
ARCHITECTURAL COATINGS (PAINTS AND THINNERS)	11	12	13
OFF-ROAD EQUIPMENT (OTHER)	10	5	4
Commercial	*3*	*1*	*<1*
Oil Drilling and Workover Rigs	*2*	*1*	*<1*
Transport Refrigeration Units	*1*	*<1*	*<1*
Industrial Equipment	*1*	*<1*	*<1*
Cargo Handling Equipment	*0*	*<1*	*<1*
Airport Ground Support Equipment	*0*	*<1*	*<1*
Other	*3*	*<2*	*1*
FARM EQUIPMENT (COMBINES AND TRACTORS)	10	5	3
GASOLINE-FUELED COMMERCIAL TRUCKS	9	5	3
OFF-ROAD EQUIPMENT (LAWN AND GARDEN)	9	7	6
Lawn and Garden Residential	*5*	*<4*	*<3*
Lawn and Garden Commercial	*4*	*<4*	*<4*
LIVESTOCK WASTE (BROILERS)	8	8	8
PRESCRIBED BURNING	8	8	8
COATINGS (PAINTS AND THINNERS - NON ARCHITECTURAL)	8	9	10
PETROLEUM MARKETING (GASOLINE EVAPORATIVE LOSSES)	8	9	10
OFF-ROAD RECREATIONAL VEHICLES	7	9	12
LIVESTOCK WASTE (RANGE CATTLE)	7	7	7
AIRCRAFT	7	10	11
MOTORCYCLES	6	5	6
AG BURNING	6	6	5
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	5	3	2
LIVESTOCK WASTE (FEEDLOT CATTLE)	5	3	3
GAS CANS	5	2	2
All other sources	36	39	42

Note: Due to rounding, subcategory emission sums may not match the listed total for the category.

TOTAL	**452**	**406**	**414**
Subtotal: On-Road Mobile Sources	*99*	*58*	*42*
Subtotal: Off-Road Mobile Sources	*74*	*61*	*59*

In many cases, the same controls needed to reduce summertime ozone levels will also have a positive impact on wintertime PM2.5 levels. Cleaning up the NOx sources in the San Joaquin Valley is an integral part of the State Strategy to control both ozone and PM2.5 concentrations.

Many actions already taken by both the District and the ARB have reduced emissions in the San Joaquin Valley. These actions include the adoption of stringent controls on stationary sources as well as reductions in tailpipe emissions from motor vehicles and off-road equipment. Adopted controls will result in an expected decline in combined ozone precursors of NOx and ROG by 27 percent from 2006 levels by 2013, despite the projected growth in the San Joaquin Valley.

Proposed Local Control Strategy

The San Joaquin Valley Air Pollution Control District has the lead role in defining how quickly the Valley can come into attainment. The District published the San Joaquin Valley Draft Ozone Plan (draft Valley Plan) in October 2006. The draft Valley Plan outlined the emission control strategies that the District will pursue to achieve new NOx and ROG reductions needed for attainment. These reductions focus on achieving near-term ROG reductions from sources under the District's authority. In addition to near-term ROG reductions, the draft Valley Plan identified a suite of stationary and area-wide source control measures to achieve additional NOx reductions needed to demonstrate attainment of the federal standard.

The opportunities to achieve significant additional NOx reductions are somewhat limited, because stationary sources have been largely controlled with adopted rules. In recent years, the District has adopted some innovative new rules on uncontrolled sources. In December 2005, the District became the first local authority to adopt an Indirect Source Review (ISR) rule to mitigate the air quality impacts from new land development projects.

In order to achieve greater NOx reductions, the District staff is exploring opportunities to achieve greater emission reductions through regional incentive programs. The District has a history of successfully implementing programs to more rapidly replace older, dirtier mobile source equipment with cleaner, new equipment. Many of the specialized fleets in the Valley, including the tractors and on-road trucks used by the agricultural industries are long-lived and infrequently modernized. The draft Valley Plan relies on incentive funding to achieve substantial new emission reductions from these and other sources with long lives and/or low modernization rates. The incentive programs complement ARB regulations for mobile sources.

The District Governing Board adopted California's first rule controlling ROG emissions from wineries. The District has also adopted rules which require

significant ROG reductions from the raising of livestock, which provides the additional benefits of reducing ammonia emissions from dairies, a significant source of emissions in the Valley. The draft Valley Plan proposes to continue this approach through the promulgation of controls and management practices to reduce ROG emissions from large scale composting activities.

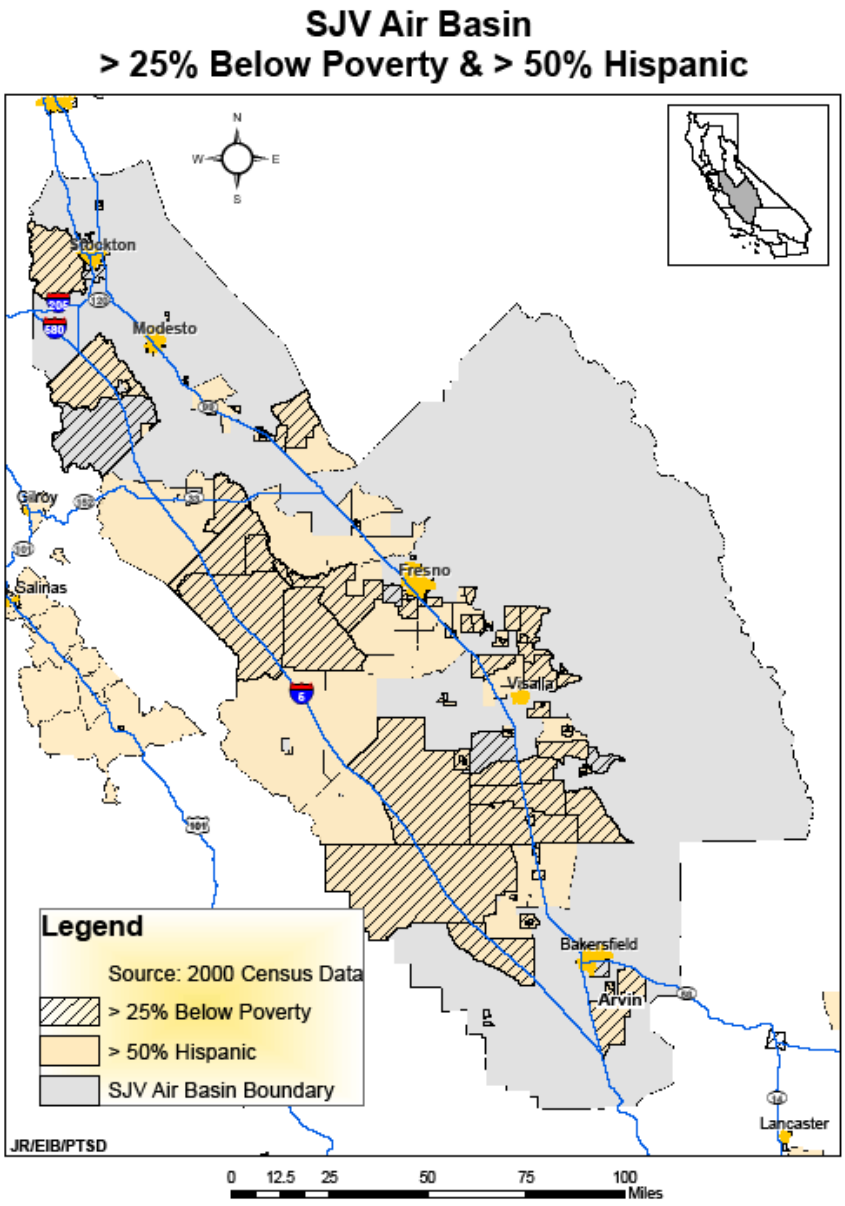
Recognizing the need for clean air and a strong economy, California Governor Arnold Schwarzenegger established the California Partnership for the San Joaquin Valley. The partnership brought State agency secretaries and Central Valley representatives together to make recommendations to the Governor regarding changes that would improve the economic well-being of the Valley and the quality of life of its residents. Specific to air quality, the Partnership organized an air quality subcommittee which made recommendations on the need for increased economic incentives for businesses to accelerate modernization of polluting vehicles and equipment. The District and ARB staffs participated in this effort and provided technical support in the development of the strategy recommendations. The Governing Board of the District unanimously endorsed the concepts in the recommendations made by the Partnership's air quality subcommittee.

Environmental Justice Considerations

Another consideration in the development of the air quality plans is the impact of the strategies on environmental justice communities. State law defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation and enforcement of environmental laws, regulations, and policies. To achieve this end, one objective of the Plan must be to ensure that no group bears a disproportionate air pollution burden, and the plan benefits all Valley communities.

As part of its work for the Carl Moyer Program, the District has recognized environmental justice is a concern throughout the San Joaquin Valley. As can be seen in the figure on the following page, low income areas, usually with a large Hispanic population, are present throughout the entire length of the Valley. Because this is a regional ozone plan that provides air quality benefits to the entire Valley, all potential environmental justice areas will benefit. People living in the southern and central Valley will receive the largest benefits as these areas currently have the Valley's worst air quality.

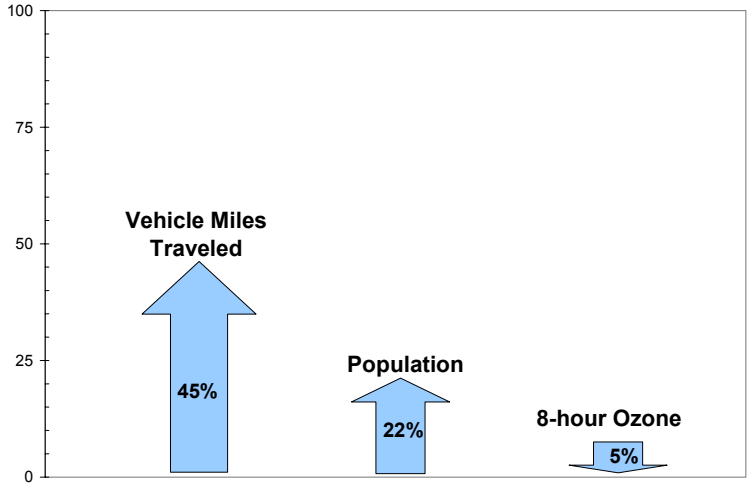
It is important to note that the area where it will be most difficult to attain the ozone standard, Arvin, is a low income area with a large Hispanic population. Therefore, taking the necessary steps to achieve healthy air quality in the Arvin area is critical to both attaining the ozone standard and achieving environmental justice goals.



Benefits of the Proposed State Strategy in the San Joaquin Valley

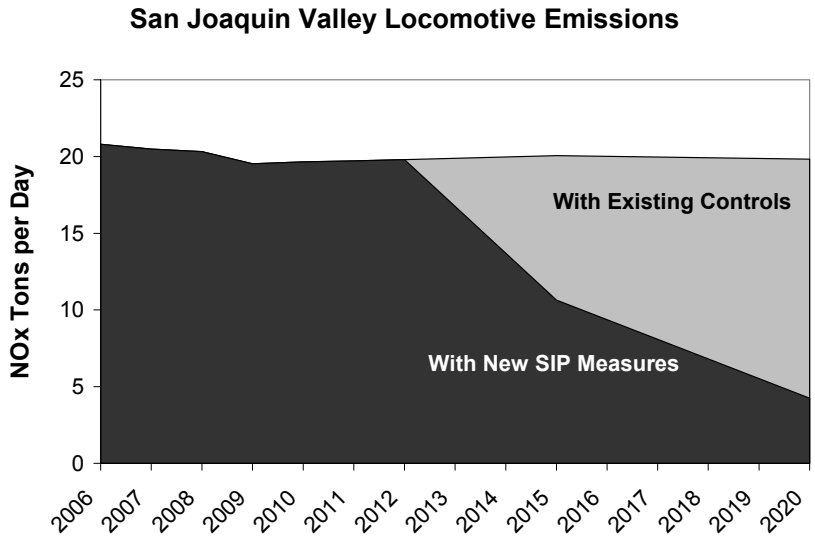
The new control measures under development will build upon and continue the success of California's pioneering mobile source control program. This success comes despite the tremendous growth the Valley has experienced over the past decade. The following figure illustrates the decline in 8-hour ozone design values, even while the population of the Valley has grown, as has the number of miles people are driving in the Valley.

San Joaquin Valley
Growth in Population and Vehicle Miles Traveled While the 8-hour Ozone Design Value is Declining
(1995-2005)

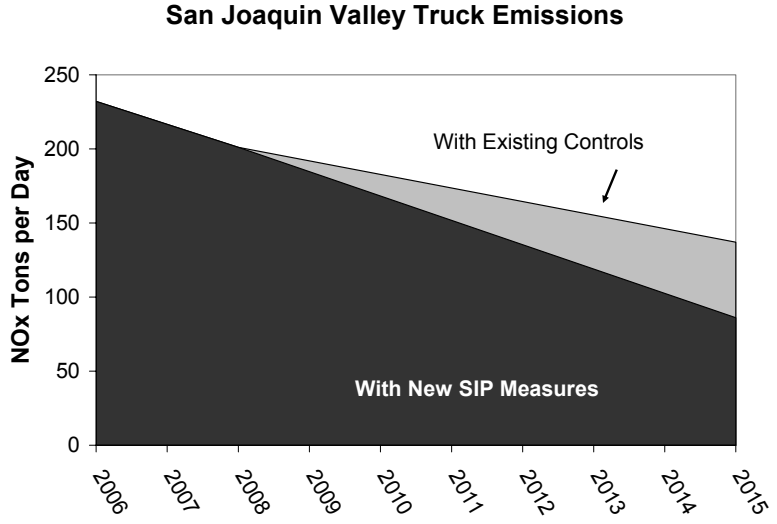


In the development of the proposed emission control measures, ARB staff considered all the emission reduction needs of the San Joaquin Valley for both ozone and PM2.5. Near-term, the proposed measures provide significant new NOx reductions needed for both ozone and PM2.5 attainment. The measures proposed in this document focus on what can be done to bring newer, cleaner vehicles and equipment into service more rapidly. The NOx measures also work to ensure that the vehicles and equipment in use remain clean over their entire useful lives. Long-term, the proposed concepts seek to ensure continued clean operation, as well as to take advantage of new technology as it becomes available.

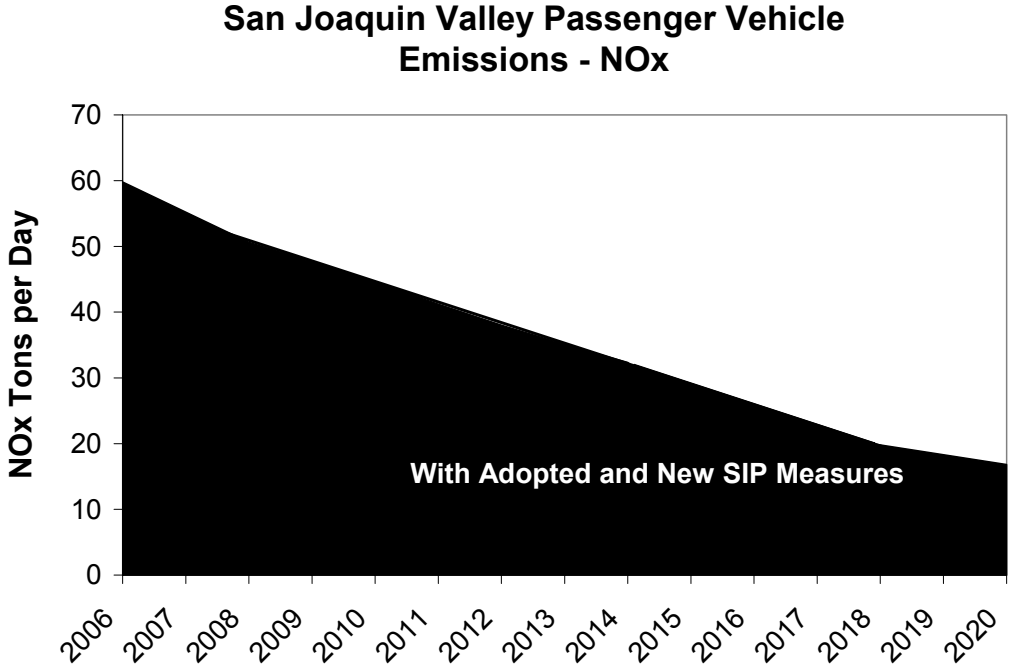
The following figure shows the expected emission reductions from locomotives, a less well controlled emission source under Federal jurisdiction, which will be achieved through the implementation of the proposed locomotive measure. The locomotive measure seeks to bring the cleanest new locomotives into service in California as quickly as they become available. This will be critical as the goods movement industry in California expands and rail traffic increases.



The San Joaquin Valley has the two most heavily traveled major north-south highways in California. The heavy-duty trucks in use along this corridor contribute significantly to the emission load in the Valley. The figure below illustrates the emission reductions which will be achieved through the implementation of the truck measures in the State Strategy under development. On-road trucks have been subject to emission control requirements for the past decade. Because the trucks with the cleanest engines will not even enter service until 2010, ARB's proposed new measures have a two-pronged approach: to clean up older trucks through replacement and emission control retrofits, and to ensure that the trucks in operation are well maintained and the emission control equipment is functioning as expected.



While California's passenger vehicle emission standards have resulted in some of the cleanest cars and trucks in the world, passenger vehicles continue to be a large source of NOx emissions in the Valley. The San Joaquin Valley is seeing double-digit growth in both population and vehicle mileage travel. Additionally, emission control systems naturally deteriorate over time. Therefore, ensuring that the cars and trucks on the road remain clean and well maintained is a priority. The figure below illustrates the emission reductions to be achieved through the passenger car and truck strategy under consideration.



Achieving emission reductions from farm equipment poses a challenge in the San Joaquin Valley. Fortunately, between now and 2021, emissions from farm equipment are expected to decline by more than 60 percent as older tractors and equipment are replaced with newer and lower polluting equipment. To achieve additional near-term emission reductions for PM2.5 attainment and progress on ozone standards, ARB and District staff will work to coordinate regulatory development and incentive funding. The agricultural industry has been working to identify federal grant opportunities, through the Farm Bill, to expedite this effort even further.

Attainment Demonstration

The SIP must identify all of the measures that will provide the emission reductions needed for attainment. ARB staff has been exploring aggressive new emission reduction measures, which will be brought before the Air Resources Board in Spring 2007 and which will provide substantial progress towards attaining the 8-hour ozone standard in the Valley. The measures focus on

getting newer, cleaner vehicles and equipment into service more quickly and on ensuring that the mobile sources operating in California remain clean over their entire useful lives. The proposed new measures under development by the staff of the District and ARB will achieve significant new reductions in smog-forming emissions in the San Joaquin Valley by 2021 – on the order of 60 tons per day of NOx and 65 tons per day of ROG. However, even with these additional reductions, the San Joaquin Valley will still fall short of the emission reductions needed to attain the federal 8-hour ozone standard by 2021.

While ARB staff's proposed State Strategy is very aggressive, it does not provide all the emission reductions needed for attainment in the Valley. ARB staff therefore performed a broad brush analysis to see whether the shortfall could be covered by assuming complete replacement of mobile source fleets with the cleanest new technology standards phasing in from 2007-2014. Cost was not a constraining factor in this analysis. ARB staff considered the constraints of legal authority, since SIP measures addressing sources not under our authority to control cannot be approved.

In our analysis, shown in the table below, we made the following assumptions: in 2020 the Valley would have no passenger vehicles older than 10 years; all diesel trucks would meet the extremely stringent 2010 standards; and all diesel construction and farm equipment would meet the most stringent Tier 4 standards.

All New Fleets Analysis Unconstrained by Cost

Source	Remaining 2020 Emissions (tpd)
Passenger vehicles	*5*
Diesel trucks	*43*
Construction and other equipment	*7*
Farm equipment	*9*
Aircraft	5
Locomotive	21
Stationary/area-wide sources	103
Subtotal of remaining emissions from above categories	193
All other NOx sources	27
Total of all remaining emissions	220
Carrying capacity	160

In the above table, the top four rows are italicized to indicate the categories for which we assume that all vehicles and equipment meets the cleanest adopted emission standards. Because the ARB does not have emission standard setting authority for aircraft, locomotives, stationary sources or area-wide sources, the

emissions reported above for those categories come directly from the standard emission inventory for 2020. Included in the category "all other NOx sources" are commercial gas trucks, motorcycles, buses, motor homes, ships and commercial boats, off-road recreational vehicles and gas powered off-road equipment.

The result was a NOx emission level of 220 tons per day compared to a carrying capacity of 160 tons per day. Close to half of the remaining emissions, 103 tons per day, are from stationary and area-wide sources. Based on these types of analyses, long-term concepts that include new technologies for both mobile and stationary sources will be needed. This makes reclassification to extreme necessary in ARB staff's view.

Lacking all of the emission reductions needed to close the gap by 2021, the San Joaquin Valley is left with only one realistic option: to request that U.S. EPA reclassify the San Joaquin Valley nonattainment area to an extreme classification. While an extreme classification has impacts on industrial growth, it also allows the San Joaquin Valley to take advantage of the full suite of tools allowed by the Act, including the use of new emission control techniques which are expected to develop in the future. The impacts of reclassification are borne locally, so the decision to be reclassified is one which should properly be made by the local air quality agency. The table on the following page summarizes the attainment demonstration and relies on the provisions for long-term commitments under section 182(e)(5) of the Clean Air Act.

From today's emission levels, reaching the emission targets for attainment will take NOx emission reductions of 490 tons per day. The existing control program will yield 350 tons per day of reductions between today and 2024. Proposed new measures would generate another 53 tons per day of NOx reductions by 2024. This leaves a gap of 87 tons per day to be addressed by long term measures.

Attaining the ozone standard in the San Joaquin Valley will require continued efforts at all levels of government. ARB staff will continue to track promising new mobile source emission reduction technologies. This will include technologies to ensure that new sources are as clean as possible and will leverage technology development to keep existing equipment operating at its intended levels. U.S. EPA will need to continue to reduce emissions from sources under its authority. In the San Joaquin Valley, this will require additional reductions from the on-road trucks registered outside of California and locomotives moving goods up and down the Valley, and continued progress to clean up the off-road equipment under its control.

As mobile sources continue to get cleaner, stationary and area-wide sources will own a greater share of ozone forming emissions. Substantial emission reductions will be achieved in the near-term through the use of programs which speed up the transition to cleaner mobile sources. However, as the adopted mobile source controls reach full implementation by 2020, new technologies will

be needed to further reduce both mobile and stationary source emissions. The District has a history of implementing first-of-their-kind emission control regulations. This tradition will need to continue as cleaner industrial and commercial technology becomes available.

Attaining the standard as quickly as practicable is a priority for both the ARB and the District. Unfortunately, there is no approvable mechanism to demonstrate to U.S. EPA that the Valley can attain the ozone standard without using all of the tools the Clean Air Act provides. While bumping to extreme extends the attainment date until 2024, substantial progress is expected over the next decade. Air quality modeling predicts that all of the Valley will be brought into attainment prior to 2024, with the exception of Arvin, located southeast of Bakersfield. And even Arvin will see dramatic improvement as the proposed control measures are implemented.

Setting and Meeting the Emission Reduction Target for Ozone Attainment

San Joaquin Valley (2023)		
	NOx	**ROG**
2006 Emissions Inventory	650	452
Carrying Capacity	160	345
Emission Reduction Target	490	107
Emission Reductions from Existing Program	350	38
Emission Reductions from New Local Measures	8	46
Emission Reductions from New State Measures	45	23
Long-Term Concepts	87	--
Total Reductions Identified	403	107

(2006 Emissions Inventory) – (Carrying Capacity) = (Emissions Reduction Target)
2006 Emissions Inventory = Amount of ozone-forming emissions.
Carrying Capacity = Pollutant emissions limit that ensures air quality standards are met.
Emission Reduction Target = Amount of emissions that must be reduced to meet the standard.
Emission Reductions from Existing Program. Emissions reduced from measures adopted or implemented through 2005.
Emission Reductions from New Measures. Emissions reduced from measures in the State Strategy or new local measures adopted after 2005.
Long-Term Concepts. Emissions reduced from measures adopted after 2020 that rely on new or evolving technology, as allowed in section 182(e)(5) of the Clean Air Act.

Reasonable Further Progress

The Clean Air Act requires that areas classified moderate or above demonstrate ongoing progress towards reducing emissions and attaining the air quality standard. The San Joaquin Valley's expected progress at each of the milestone years is summarized in the following table. As can be seen, emission reductions from the existing control program will enable the Valley to demonstrate reasonable further progress through 2017. For 2020 and 2023, the Valley will need to rely on reductions from new measures to meet progress requirements.

San Joaquin Valley Reasonable Further Progress Reductions from Existing and Proposed Programs

	Milestone year					
	2008	**2011**	**2014**	**2017**	**2020**	**2023** (for 2024 attainment)
ROG or NOx percent reduction required from 2002 levels	18%	27%	36%	45%	54%	63%
ROG percent reduction projected from existing program 2002 levels used to meet RFP	9.0%	13.2%	13.9%	14.7%	14.3%	13.0%
NOx percent reduction projected from existing program from 2002 levels used to meet RFP	9.0%	13.8%	22.1%	30.3%	34.7%	39.4%
Total ROG and/or NOx percent reductions from existing program used to meet RFP	18.0%	27.0%	36.0%	45.0%	49.0%	52.4%
Total ROG and/or NOx percent reductions from proposed program used to meet RFP	0.0%	0.0%	0.0%	0.0%	5.0%	10.6%
RFP percent reduction requirements met?	Yes	Yes	Yes	Yes	Yes	Yes

(This page intentionally left blank.)

5. REGIONAL SIP SUMMARIES

South Coast Air Basin

The South Coast Air Basin (South Coast) is California's largest metropolitan area. Its levels of ozone and inhalable particles under 2.5 microns (PM2.5) are among the highest in the nation despite decades of increasingly stringent state and local controls. With a population of approximately 16 million people, the South Coast is home to over 42 percent of the State's population. The South Coast is currently classified as a severe-17 nonattainment area for the federal 8-hour ozone standard, which gives it a nominal attainment date of June 15, 2021. The South Coast's ozone levels are currently 50 percent above the federal standard which make it the nation's worst ozone area. The South Coast Air Basin is also classified as nonattainment for the federal PM2.5 standard. The region is now required to attain the PM2.5 standard by 2015. The South Coast District has chosen to develop their ozone and PM2.5 attainment plans concurrently.

In designing the State Strategy, the ARB staff developed measures that would result in an aggressive reduction of precursor emissions for both ozone and PM2.5. The strategy provides substantial progress towards attainment for both pollutants. However, the state of the science for PM2.5 modeling is relatively new and very complex, with a significant level of uncertainty inherent in the results. Given the importance of developing an effective attainment demonstration and the cost of the proposed strategy, the ARB staff believes an early SIP submittal is not advisable. Taking a few additional months to address the major technical and regulatory issues involved and to ensure that the results are the best possible will not slow the pace of ARB's actions. ARB staff is recommending that we make full use of the time provided by U.S. EPA to develop the control strategy attainment demonstration for PM2.5.

Ozone air quality modeling indicates that a number of combinations of ROG and NOx emission levels, or "carrying capacities," can be expected to result in attainment of the 8-hour ozone standard throughout the South Coast Air Basin. The South Coast district chose a carrying capacity of 300 tons per day ROG and 286 ton per day NOx emissions in their draft plan. Projected 2020 ROG emissions must be reduced by 54 percent, and NOx emissions by 50 percent, to meet this carrying capacity. U.S. EPA guidance indicates that all of the emission reductions needed to demonstrate attainment of the 8-hour ozone standard by June 15, 2021 must be in place by the beginning of the ozone season in 2020.

ARB's proposed strategies, along with the existing control program and a small reduction in stationary source emissions, provide 78 percent of the emission reductions needed to demonstrate attainment of the ozone air quality standard by 2021.

The Clean Air Act allows nonattainment areas to “bump up” to a higher classification if more time is needed to attain the standard, if certain conditions are met. ARB believes that a reclassification to “extreme” is appropriate for the South Coast. An extreme classification would extend the attainment date to 2024, and acknowledges that some of the reductions needed for attainment will have to come from strategies that are outside of the scope of our currently available technologies and infrastructure. We expect that the ozone plan will be updated periodically to incorporate new controls that will allow us to achieve the remaining needed reductions.

Topography and Meteorology

The clean air challenge in the South Coast has always been formidable. Complex terrain and weather patterns make the region a natural sink for the accumulation of emissions and sustained high pollution levels. Along the coastal area, better air quality prevails because of the relatively mild climate, cooler temperatures, and a pattern of onshore airflow. However, in the inland portion of the air basin, a combination of abundant sunshine, warm temperatures, and poor vertical air mixing is conducive to the formation of ozone, commonly referred to as “smog.” The problem is further aggravated by the surrounding mountains that act together with the weather and air pollutant emissions.

The problem is further heightened by the extent of exposure to elevated pollution levels. The South Coast Air Basin is the nation’s second largest urban area and California’s largest metropolitan region. It includes the southern two-thirds of Los Angeles County, all of Orange County, and the western urbanized portions of Riverside and San Bernardino counties. The South Coast Air Basin is home to over 40 percent of the total State population, or about 16 million people, and over 10 million vehicles. Fifty thousand heavy duty diesel trucks travel nearly 10 million miles through the region annually, and well over 50,000 diesel engines are used to move goods and power construction and mining equipment.

The good news is that air quality for all pollutants in the Basin continues to improve, with recent years registering the lowest levels since measurements began over five decades ago. During the 1960s, maximum 1-hour concentrations were well above levels considered safe for public health -- more than four times the current health standard. Today, the maximum measured concentrations are less than one-third of those peak concentrations. Moreover, long-term ozone air quality trends continue to show an overall improvement. The number of days above both the one and eight-hour standards has also declined dramatically.

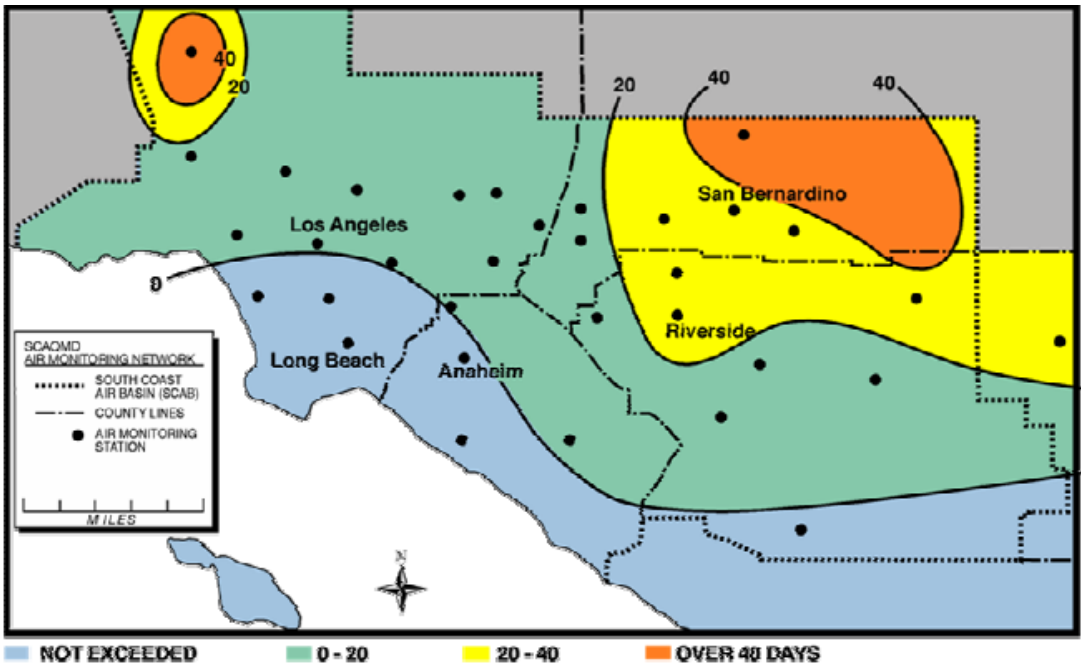
Because of weather patterns and geography, residual pollution from the South Coast Air Basin is transported to several downwind air basins -- the Mojave Desert, the Salton Sea, the South Central Coast, and San Diego. As ozone

precursor emissions in the South Coast Air Basin decrease over time, the transport impact on the downwind areas will also decline.

Current Air Quality

Ozone

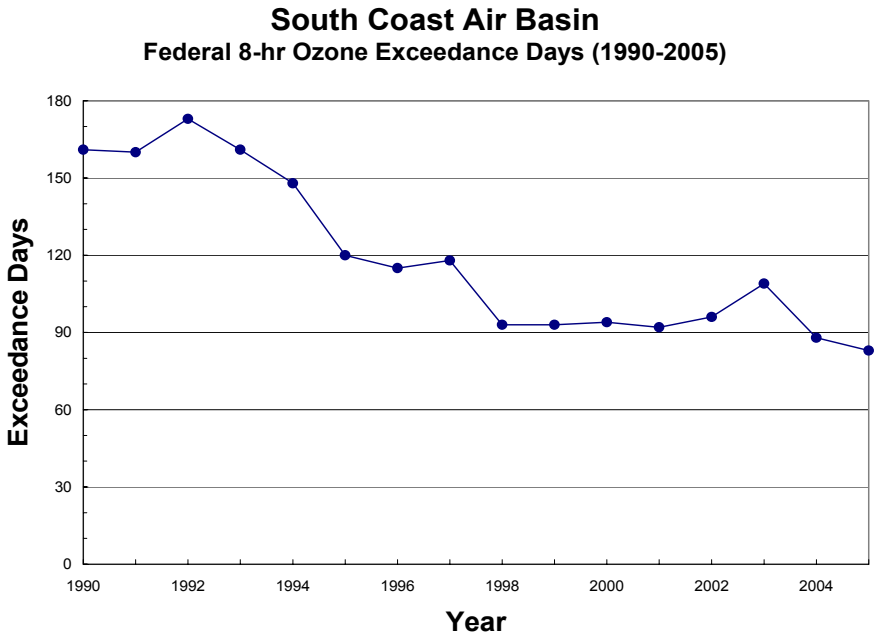
The South Coast is a severe-17 nonattainment area for the federal 8-hour standard for ozone. It has until 2021 to attain the standard although an extension to 2024 is possible if the South Coast requests a re-classification to the next most severe category (extreme).



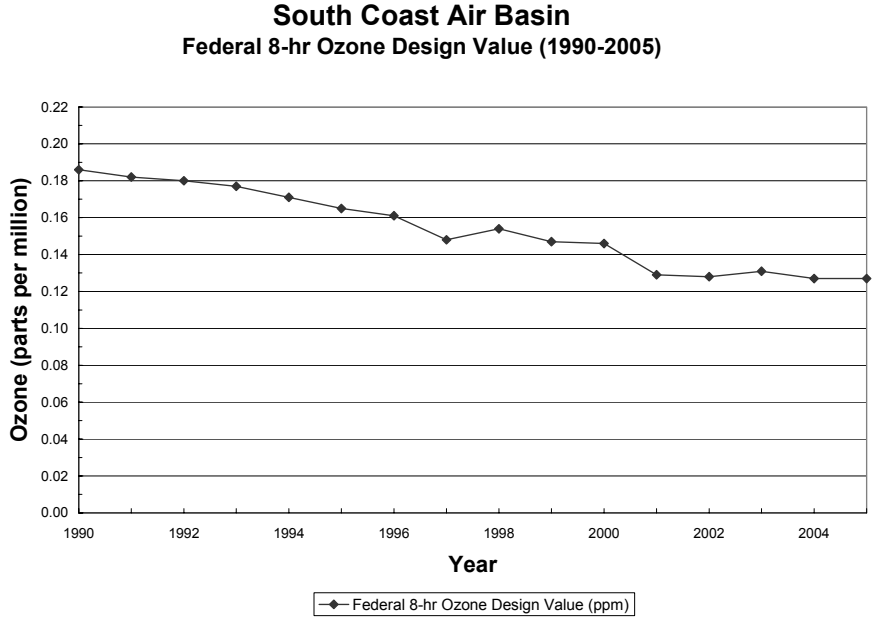
SCAQMD, Draft 2007 AQMP

Ozone - 2005
Number of Days Exceeding the Federal Standard
(8-hour average ozone > 0.08 ppm)

However, there has been significant improvement in air quality in the region over the last two decades. For instance, in 2005 the air basin exceeded the federal ozone standard on 83 days. While still unacceptably high, this constituted 48 percent fewer days than in 1990. Most areas within the region saw a decrease of 45 percent to 85 percent in the number of days over the 8-hour ozone standard between 1995 and 2005. The following figure depicts the number of days in 2005 exceeding federal standards for the federal 8-hour ozone standard. All of the exceedances occurred during the May to October “smog season.” During the peak ozone season the federal ozone standard is exceeded somewhere in the Basin one of every two days.

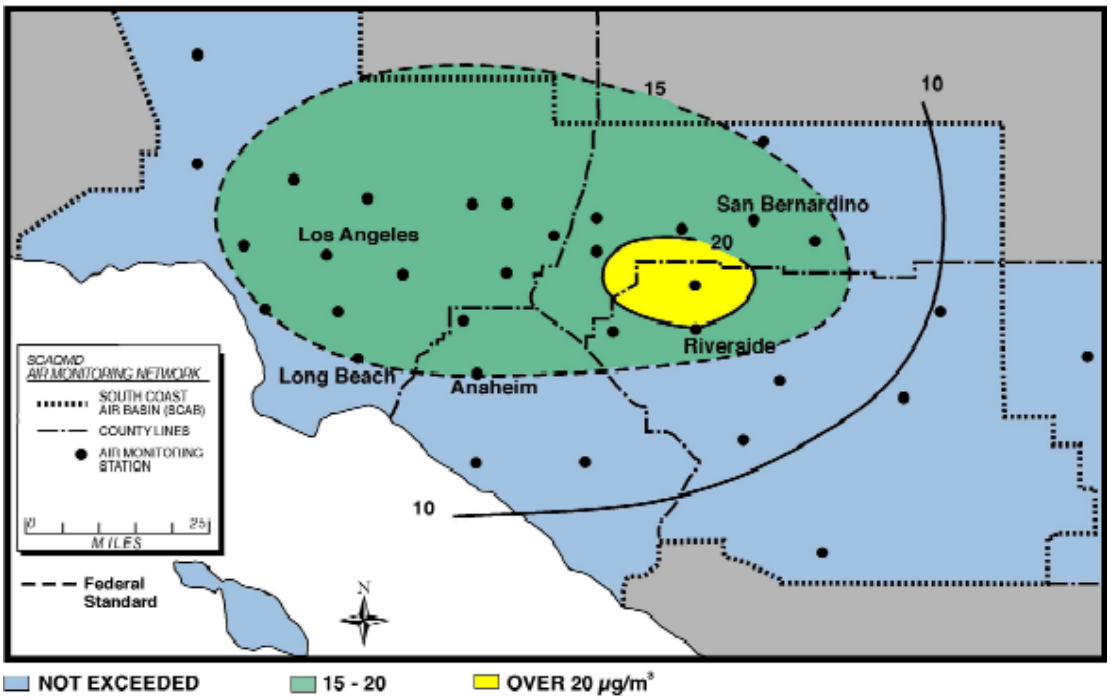


The next figure shows a commensurate decline in 8-hour ozone concentrations as expressed by the three-year design value. Despite substantial air quality improvement, inland areas (northern Los Angeles County, southwestern Riverside, and San Bernardino County) continue to experience high ozone levels. The 2005 ozone design value was 50 percent over the health-based standard.



PM2.5

The South Coast Air Basin is also classified nonattainment for the federal standard for PM2.5, and is now required to attain the PM2.5 standard by 2015. Although high PM2.5 concentrations occur throughout the year, the highest concentrations often occur during the fall. PM2.5 values are declining throughout the air basin, and the South Coast now meets the current 24-hour standard of 65 ug/m^3. However, the PM2.5 annual average standard 15 ug/m^3 continues to be exceeded throughout the basin.



SCAQMD, Draft 2007 AQMP

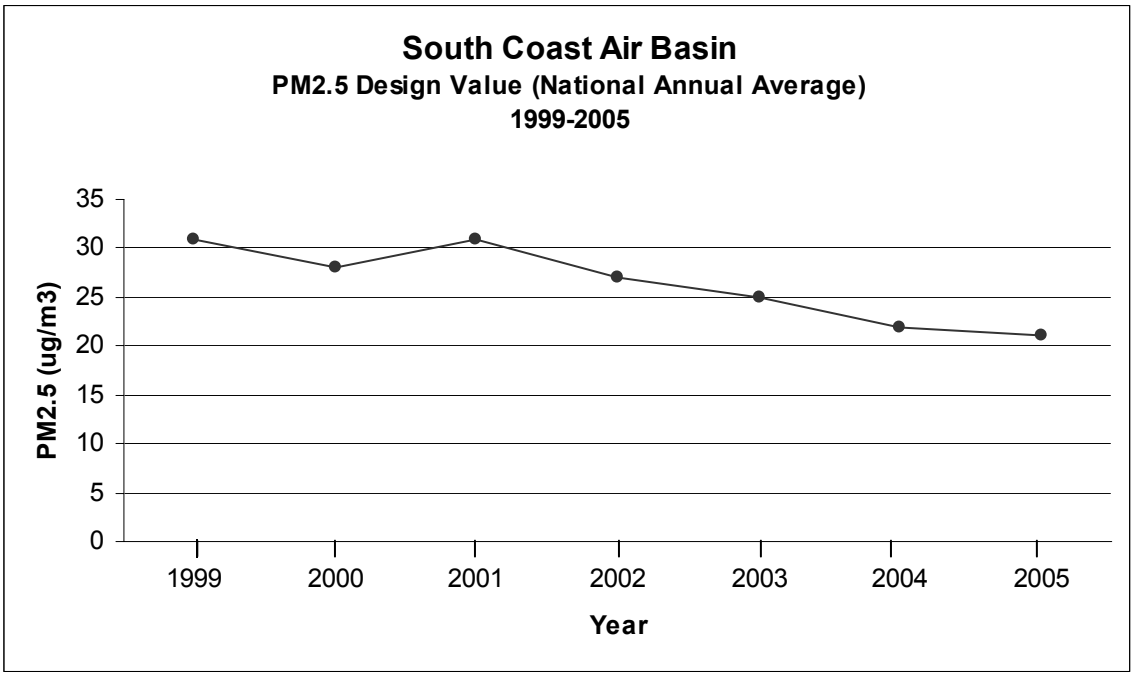
PM2.5 - 2005
Annual Average Concentration Compared
to Federal Standard
(Federal standard = 15 µg/m3, annual arithmetic mean)

PM2.5 in the South Coast Air Basin is comprised of both directly emitted particles, such as dust and soot, and "secondary" aerosol particles created when gaseous pollutants, including ROG, NOx, sulfur dioxide (SOx), and ammonia, react in the atmosphere to form PM2.5.

The following figure shows the change in 3-year average PM2.5 design values in the South Coast Air Basin from 1999 through 2005.[1] While

[1] A design value is the pollutant concentration at a particular site that must be reduced to, or maintained at or below the ambient air quality standard to assume attainment. The design value number tells us how a particular site or area compares with that standard. Is the starting point for developing attainment

PM2.5 concentrations were relatively stable from 1999 through 2001, recent years have seen a strong downward trend in both concentrations and days with high values. All South Coast air monitoring sites with complete data showed a decrease in the PM2.5 annual average design value concentrations for the years 2001 through 2005. Rubidoux, the Riverside County site that where the highest values have been recorded in recent years, saw annual design value concentrations decrease 25 percent, from 30.1 ug/m^3 to 22.7 ug/m^3. Other high monitoring sites also recorded improvements in this period: the Los Angeles, North Main Street site dropped 13 percent, and the San Bernardino site dropped 21 percent.



The region saw a corresponding decrease in the number of days with concentrations higher than the federal 24-hour standard. Rubidoux went from 17 days above the standard in 2001 to four days in 2005, and San Bernardino went from five days to one.

Emission Inventory

The growth assumptions used to estimate future emissions are critical elements in any attainment demonstration plan -- they directly impact the amount of emission reductions needed to reach the emissions target. State law requires the South Coast District to utilize population growth and economic projections developed by the Southern California Association of Governments (SCAG) in its plans and emission projections. Emission projections for stationary and

---

demonstration plans. The PM2.5 annual standard is met when the 3-year average of a site's annual mean concentration is 15.0 µg/m3 (micrograms per cubic meter) or less.

areawide sources in the 2007 Plan are based on sector-specific growth forecasts that reflect the SCAG regional growth forecasts. The inventory has been adjusted to reflect emission controls adopted through December 31, 2006. Mobile source emissions were generated with ARB's latest mobile source emissions models, EMFAC2007 and OFFROAD. The EMFAC2007 activity levels (vehicle miles traveled) for the South Coast Air Basin reflect SCAG projections. The emissions and forecasts that are depicted in the State Strategy reflect summer seasonal activity, temperatures, and humidity. Normally, the inventory for an annual average standard such as PM2.5 would be calculated on an annual average basis. The summer season inventory is used for ozone because it reflects the activity levels and conditions that occur when high ozone levels occur in the South Coast. ROG estimates vary most when going from a summer to an annual average inventory because of higher evaporation rates under summer conditions. Since seasonal adjustments have negligible impacts on NOx, SOx, and PM2.5 emissions (the primary pollutant of concern for PM2.5), we have decided for the sake of consistency to use a seasonal planning inventory for both pollutants.

Mobile Source Emissions

The mobile source emission inventories used in the 2007 Plan represent many improvements in the models that are used to estimate emissions from both on-road and off-road sources. As a result, our estimates of the emissions generated by mobile sources have increased relative to those used in the 2003 SIP. These higher estimates do not indicate that actual emissions are increasing – on the contrary, actual emissions from cars and trucks have declined and will continue to decline rapidly over time. This progress comes because of State and federal requirements for cleaner engines and fuels, and despite significant growth in population and vehicle usage.

On-Road

EMFAC2007, California's new on-road motor vehicle emission factor model, was used to generate the on-road mobile source emission inventory for the 2007 Plan. EMFAC2007 represents a comprehensive review and revision of the on-road inventory when compared to EMFAC2002, which was used in the 2003 SIP. The major changes reflected in EMFAC2007 include updated information on emissions from heavy duty diesel in-use engines, smog check testing, corrections to estimated fuel emissions, and more accurate vehicle population numbers.

Off-Road

The 2007 Plan reflects improved estimates of engines and equipment population, usage, emission rates, and equipment deterioration for most categories of off-road mobile sources. The inventory also includes revised estimates of evaporative emissions. The extensively revised ship and train emission

inventories that were developed for ARB's Goods Movement Emission Reduction Plan have also been incorporated into the OFFROAD model.

Ozone and PM-related emissions in the South Coast Air Basin are generally consistent with the overall downward trend statewide. Although motor vehicle miles traveled in the basin continue to increase, on-road vehicle emissions are dropping because of more stringent vehicle emission standards and fleet turnover. This trend will be strengthened between 2000 and 2020 as newer, lower-emitting vehicles become a larger percentage of the fleet. Likewise, as new engines and equipment replace older, more polluting models, emissions will decline more steeply. The issue before us is not whether, but how quickly emissions from the mobile source fleet will be reduced dramatically as required for clean air purposes.

Ozone Emission Inventory

Mobile sources are the dominant source of air pollution in the South Coast, accounting for almost 80 percent of ozone precursor emissions in the Air Basin in 2006. Mobile sources encompass a broad variety of vehicles and equipment that are found both on-road and off-road. These sources include passenger vehicles, trucks, and buses, gasoline-fueled leaf blowers, large diesel-fueled ocean liners, commercial harborcraft, cargo handling and construction equipment, aircraft, and trains.

2007 Ozone Plan
ROG and NOx Baseline Emission Trend 2006-2020*
(South Coast Air Basin Summer Season Inventory in tons per day)**

Source Category	ROG			NOx		
	2006	2020	% Change	2006	2020	% Change
Stationary/Areawide	259	274	+6%	87	68	-22%
On-Road	264	116	-56%	526	190	-64%
Off-Road	208	147	-29%	360	272	-24%
TOTAL	**732**	**537**	**-27%**	**972**	**530**	**-46%**

*Reference: ARB
**Numbers may not add due to rounding.

Stationary sources are primarily industrial and include refineries, power plants, and smelters. Areawide sources are generally smaller, non-permitted sources or operations, and generally include gas stations, dry cleaners, paint spray booth operations, wood-burning fireplaces, residential water heaters and house paints. Responsibility for reducing emissions from these sources rests with the local air districts, except for consumer products and aerosol paints, which are under ARB jurisdiction, and gas stations where the responsibility is shared by ARB and local air districts.

The table above shows current anthropogenic (man-made) ROG and NOx emission levels from all source categories in the South Coast, and the emissions expected in the 2020 attainment year with current controls.

The next two tables show the top 25 sources of ROG and NOx emissions in the South Coast Air Basin.

ROG Emissions
South Coast Air Basin
2007 SIP Summer Season Emissions Inventory
(Prioritized by 2006)

Source Category	2006	2015	2020
PASSENGER VEHICLES	207	107	85
Passenger Cars	*114*	*49*	*36*
Light Trucks, Minivans and SUVs	*68*	*41*	*35*
Medium Duty Trucks	*24*	*17*	*15*
CONSUMER PRODUCTS	101	103	107
RECREATIONAL BOATS	64	52	50
Pleasure Boats	*50*	*39*	*36*
Personal Water Craft	*14*	*13*	*14*
OFF-ROAD EQUIPMENT (LAWN AND GARDEN)	52	40	38
Lawn & Garden Residential	*29*	*19*	*16*
Lawn & Garden Commercial	*23*	*20*	*21*
ARCHITECTURAL COATINGS (PAINTS AND THINNERS)	31	29	30
OFF-ROAD EQUIPMENT (OTHER)	28	14	12
Commercial	*14*	*8*	*6*
Industrial Equipment	*7*	*3*	*3*
Transport Refrigeration Units	*4*	*1*	*1*
Airport Ground Support Equipment	*1*	*1*	*1*
Cargo Handling Equipment	*1*	*1*	*1*
Oil Drilling and Workover	*1*	*<1*	*<1*
Other	*<1*	*<1*	*<1*
PETROLEUM MARKETING (GASOLINE EVAPORATIVE LOSSES)	27	28	30
COATINGS (PAINTS AND THINNERS - NON ARCHITECTURAL)	27	26	27
GASOLINE-FUELED COMMERCIAL TRUCKS	24	12	10
GAS CANS	21	10	8
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	20	12	9
HEAVY DUTY DIESEL TRUCKS	17	10	7
MOTORCYCLES	14	12	12
CHEMICAL (PROCESS AND STORAGE LOSSES)	11	13	14
OFF-ROAD RECREATIONAL VEHICLES	9	10	12
DEGREASING	9	10	10
OTHER (INDUSTRIAL PROCESSES)	8	9	9
OTHER (WASTE DISPOSAL)	8	7	8
AIRCRAFT	8	10	12
PRINTING	4	5	5
PETROLEUM REFINING (FLARES/EVAPORATIVE LOSSES)	4	4	4
SHIPS AND COMMERCIAL BOATS	4	3	4
Commercial Harbor Craft	*2*	*<2*	*1*
Ocean Going Vessels	*1*	*<2*	*2*
LIVESTOCK WASTE (DAIRY CATTLE)	3	1	1
ADHESIVES AND SEALANTS	3	4	5
FOOD AND AGRICULTURE (CROP PROCESSING AND WINERIES)	3	3	3
LOCOMOTIVES	3	3	3
All other sources	25	23	24
Note: Due to rounding, subcategory emission sums may not match the listed total for the category			
TOTAL	**732**	**559**	**537**
Subtotal: On-Road Mobile Sources	*264*	*142*	*116*
Subtotal: Off-Road Mobile Sources	*208*	*154*	*147*

NOx Emissions
South Coast Air Basin
2007 SIP Summer Season Emissions Inventory
(Prioritized by 2006)

Source Category	2006	2015	2020
HEAVY DUTY DIESEL TRUCKS	259	129	87
PASSENGER VEHICLES	205	94	65
Passenger Cars	*83*	*33*	*22*
Light Trucks, Minivans and SUVs	*83*	*40*	*28*
Medium Duty Trucks	*38*	*20*	*14*
OFF-ROAD EQUIPMENT (CONSTRUCTION AND MINING)	120	75	51
OFF-ROAD EQUIPMENT (OTHER)	87	49	38
Industrial Equipment	*39*	*18*	*13*
Commercial	*16*	*11*	*8*
Cargo Handling Equipment	*12*	*4*	*3*
Transport Refrigeration Units	*8*	*9*	*9*
Airport Ground Support Equipment	*5*	*3*	*3*
Oil Drilling and Workover	*5*	*3*	*2*
Other	*1*	*<1*	*<1*
SHIPS AND COMMERCIAL BOATS (Includes OCS)	75	89	104
Ocean Going Vessels	*48*	*74*	*90*
Commercial Harbor Craft	*25*	*16*	*14*
GASOLINE-FUELED COMMERCIAL TRUCKS	36	23	19
LOCOMOTIVES	31	23	26
RESIDENTIAL FUEL COMBUSTION	18	14	14
Water Heating	*7*	*3*	*3*
Space Heating	*5*	*4*	*4*
Cooking	*3*	*2*	*2*
Other (Clothes Dryers, BBQs, Pool Heaters and Fireplaces)	*2*	*5*	*5*
MANUFACTURING AND INDUSTRIAL (BOILERS- IC ENGINES)	17	15	15
SERVICE AND COMMERCIAL (BOILERS- IC ENGINES)	16	11	11
RECREATIONAL BOATS	16	17	18
Pleasure Boats	*14*	*15*	*14*
Personal Water Craft	*1*	*3*	*4*
AIRCRAFT	16	23	27
PUBLIC TRANSIT BUSES	12	11	9
FARM EQUIPMENT (COMBINES AND TRACTORS)	9	5	3
ELECTRIC UTILITIES	9	7	7
PETROLEUM REFINING (COMBUSTION)	7	6	6
OFF-ROAD EQUIPMENT (LAWN AND GARDEN)	7	6	6
Lawn & Garden Commercial	*15*	*5*	*5*
Lawn & Garden Residential	*1*	*1*	*1*
OTHER (FUEL COMBUSTION)	7	5	4
PETROLEUM REFINING (FLARES)	5	4	4
SCHOOL BUSES	4	4	4
COMMERCIAL TRANSIT BUSES	4	2	1
MOTOR HOMES	3	2	1
MOTORCYCLES	3	3	3
INCINERATORS	2	2	2
OIL AND GAS PRODUCTION (COMBUSTION)	1	<1	<1
All other sources	3	4	5

Note: Due to rounding, subcategory emission sums may not match the listed total for the category

TOTAL	**972**	**622**	**530**
Subtotal: On-Road Mobile Sources	*526*	*267*	*190*
Subtotal: Off-Road Mobile Sources	*360*	*287*	*272*

The emission inventory projects that existing controls, particularly controls imposed on cars and trucks, will significantly reduce emissions between 2006

and 2020. Emissions from on-road motor vehicles are expected to decline by over 60 percent, combined ROG and NOx, while off-road vehicles and equipment will decline by 26 percent, and emissions from stationary and area sources are projected to increase slightly.

The sources of ROG emissions in the South Coast are diverse. Emissions from passenger vehicles make up over one-third of the inventory in 2006, but are projected to decline to 15 percent of the inventory by 2020. ROG emissions from stationary and area sources are projected to increase during this period. Although this slight increase is spread among categories of stationary and area sources, the most pronounced increase is expected to come from the use of consumer products.

PM2.5 Emission Inventory

The following table shows the breakdown of ROG, NOx, sulfur oxides (SOx), and PM2.5 by broad source category for 2006 and 2014. ROG, NOx , and SOx are emitted as gaseous pollutants but can contribute to the formation of ambient PM2.5 under the right atmospheric conditions. Ammonia emissions also contribute to PM2.5 formation in the eastern part of the South Coast Air Basin, but those emissions are declining with reductions in dairy operations.

On-road and off-road mobile sources accounted for about 77 percent of PM2.5 and PM2.5 precursor emissions in the South Coast Air Basin in 2006. By 2014, mobile sources will account for about 69 percent of the PM2.5 and PM2.5 precursor emissions, as shown in the following table. Among mobile sources, the largest sources of PM2.5 precursor emissions are heavy-duty trucks, construction equipment, light-duty vehicles, ships, planes, and trains. Although sulfur emissions from on-road sources have declined significantly with the implementation of ultra-low sulfur diesel fuel standards, SOx emission from ships could increase by over 80 percent by 2020 unless ships also begin to use cleaner fuels.

It is important to note that not all precursor emissions will impact PM2.5 concentrations equally. Preliminary modeling indicates that directly emitted PM2.5 (fugitive dust) and NOx reductions will have the greatest impact on reducing PM2.5 concentrations.

ROG

ROG emissions have seen a moderate decline due to ARB and district rules that require the use of environmentally-friendly consumer products and solvent cleaners, population increases can offset these benefits, and pose a continuing challenge. ROG emissions from mobile sources are declining because of better evaporative controls on both vehicles and refueling operations. ROG is considered to play a lesser role in the formation of ambient PM2.5.

South Coast Air Basin
PM2.5 and PM2.5 Precursor Emissions

	Source Category	2006	2014	% Change
ROG	**Stationary/Areawide**	259	260	0
	On-Road	264	149	-43%
	Off-Road	208	158	-24%
	TOTAL	**731**	**567**	**-22%**
NOx	**Stationary/Areawide**	87	71	-18%
	On-Road	526	287	-45%
	Off-Road	360	293	-19%
	TOTAL	**972**	**651**	**-33%**
SOx	**Stationary/Areawide**	22	17	-21%
	On-Road	4	2	-42%
	Off-Road	37	25	-31%
	TOTAL	**63**	**45**	**-28%**
PM2.5	**Stationary/Areawide**	58	63	9%
	On-Road	20	17	-15%
	Off-Road	22	18	-17%
	TOTAL	**100**	**98**	**-2%**

Reference: ARB 8-Hour Ozone SIP Emission Inventory Projections, CEFS v. 1.06 (November 15, 2006)
**Numbers may not add due to rounding

NOx

NOx plays a more significant role in the formation of secondary PM2.5. South Coast NOx emissions from stationary sources such as electric utilities and refineries have declined significantly since 1990 due to early and stringent regulatory controls, and due to the District's 1994 adoption of a cap and trade program for permitted sources.[2] The South Coast NOx inventory is currently dominated by emissions from on-road and off-road mobile sources. The emissions from on-road sources subject to California requirements are projected to decrease sharply within the next 10 years. NOx emissions from some off-road sources largely subject to federal regulation, such as construction and mining equipment, are declining while others, including ships and trains, are increasing.

[2] In 1994, RECLAIM (Regional Clean Air Incentives Market) replaced the traditional regulatory structure of command-and-control for NOx and SOx permitted stationary sources, setting emission reduction targets well below federal criteria for reasonably available control technology.

SOx

Stationary sources and off-road mobile sources that use diesel fuel emit SOx that forms secondary sulfate particles. SOx emissions from ships and commercial boats are the largest single source of SOx emissions, contributing half of the SOx emissions in 2006 and a projected 40 percent of the emission in 2014. Petroleum refining operations are the next largest source with 22 percent of the SOx emissions in 2006, and 14 percent in 2014.

Directly Emitted PM2.5

Fugitive dust emissions from areawide sources including construction and unpaved roads and are expected to increase between 2006 and 2014. Exhaust, tire wear, and re-entrained road dust from on-road sources also contribute to directly emitted PM2.5 and are also expected to increase with growth in the air basin. On an annual average basis, directly emitted PM2.5 emissions contribute approximately 30 to 40 percent of the ambient PM2.5 in the South Coast Air Basin.

Emission Reductions from Goods Movement Sources

The goods movement sector is a major economic driver in the South Coast Air Basin. The ships, trains, trucks, and related equipment that make up the goods movement sector are also a major contributor to air pollution in the South Coast.

In April, 2006, ARB adopted a comprehensive plan for reducing emissions from goods movement sources to address both community impacts and regional attainment needs. This section evaluates how well the proposed State Strategy meets that commitment with respect to the South Coast.

The proposed reductions identified in this plan cannot be compared directly to the ARB Goods Movement Plan for several reasons. The inventory in this Plan, including the estimates of emissions from goods movement sources, is more refined and current. Some of the measures identified as potential controls in the Goods Movement Plan have been adopted, and the resulting reductions are reflected in the baseline inventory used in this Plan: for example, the auxiliary engine fuel standards called for in the Goods Movement Plan are shown as adopted controls in the baseline emissions for this Plan. Without this rule, ships would emit an additional 35 tons per day SOx emissions in the South Coast Air Basin in 2020.

Some of the control options identified in the Goods Movement Plan have also changed. In the Goods Movement Plan, staff recommended that ARB seek a Sulfur Emission Control Area (SECA) designation to reduce sulfur emissions from ocean-going vessels. This measure would have reduced the content of sulfur in main engine fuel from 2.5 percent in 2001 to 1.5 percent in 2010 and

0.5 percent in 2015. However, in the proposed State Strategy staff has replaced that measure with a Main Engine Fuel control measure similar to the Auxiliary Engine Fuel control measure the Board passed in December 2005. As proposed the Main Engine Fuel control measure would establish 0.5 percent sulfur fuel in 2007 and go down to 0.1 percent sulfur fuel in 2010, producing greater and much faster reductions than would a SECA designation.

The proposed State Strategy delineates various strategies to reduce emissions from the Goods Movement sector. Staff is researching the benefits of a mandatory Vessel Speed Reduction measure for ocean-going vessels in South Coast. Along with port staff, ARB is also assessing the benefits and feasibility of cold-ironing at ports to further reduce emissions from Auxiliary engines close to communities living near the ports. The following table compares the percentage ROG and NOx reductions that the proposed State Strategy would achieve from goods movement sources to the percentage reductions needed to achieve the regional carrying capacity selected by the South Coast district. The table does not reflect the additional emission reductions that will result from long term measures yet to be identified at the local, state, and federal level.

Proposed Strategy Goods Movement Reductions for the South Coast

		Year	
		2006	**2020**
ROG	**Air Basin Baseline**	1018.8	530.2
	Percent Reduction Required for Attainment		78%
	Goods Movement Baseline	276.8	185.9
	Goods Movement Source Reductions		87
	Percent Reduction from GM Sources		47%
NOx	**Air Basin Baseline**	794.4	536.5
	Percent Reduction Required for Attainment		50%
	Goods Movement Baseline	19.9	10.4
	Goods Movement Source Reductions		4.7
	Percent Reduction from GM Sources		45.2%

The Attainment Demonstration

Past regulatory actions are just a prelude to the far-reaching actions that we will need to take over the next 15 years to attain the federal 8-hour ozone and PM2.5 air quality standards in the South Coast Air Basin. The U.S. EPA promulgated these more stringent standards in 1997, based on scientific studies that pointed to serious health consequences at concentrations lower than health-based standards that existed at the time. The new air quality standards also triggered new attainment deadlines. For the South Coast the PM2.5 standard must now be met in 2015 and the ozone standard no later than 2024. This portion of the

plan discusses the role that the State Strategy will play in achieving the new federal standards in South Coast Air Basin. U.S. EPA guidance requires that the attainment demonstration provide for the necessary emission reductions one year prior to the attainment deadline.

Since the PM2.5 standard must be met a full 6-9 years before the ozone standard, the State Strategy considers the impacts and benefits of ROG and NOx reductions on two separate timetables. Additionally, since both ozone and PM2.5 are formed through a series of complex chemical reactions, our analysis considers how the timing of PM2.5 controls could affect the mix of controls for ozone attainment nearly a decade later.

Ozone

This plan utilizes photochemical modeling conducted by the South Coast District staff in consultation with the ARB's modelers and published in the District's October draft plan. The modeling identified various combinations of ROG and NOx emission levels, or "carrying capacities," that can be expected to result in attainment of the 8-hour ozone standard throughout the South Coast Air Basin. Based on ongoing modeling refinements, it is our understanding that the District will identify a carrying capacity that relies even more heavily on NOx reductions.

Summary of Ozone Attainment Demonstration for 2021
(South Coast Air Basin, Summer Emissions, tons per day)

	ROG	**NOx**
2006 Current Emissions	732	972
2020 Baseline Inventory	537	530
2021 Carrying Capacity	**304**	**238**
Total Reductions Needed for Attainment	**233**	**292**
Target Reductions[3]	**85**	**152**
-- Proposed State Measures[4]	*67*	*138*
-- Proposed District Measures[6]	*18*	*14*
Shortfall	***148***	***140***

U.S. EPA has classified the South Coast Air Basin as a "severe-17" area for ozone. The combined strategies identify about half of the emission reductions needed to demonstrate attainment of the ozone air quality standard 2021 deadline for severe-17 areas. The District's draft plan acknowledges that the adopted measures, together with new local and State near-term measures, will not reduce emissions enough to result in attainment of the federal eight-hour

[3] Targeted reductions are in addition to reductions from adopted measures.
[4] Reductions from proposed State and District measures in the draft 2007 Plan.

ozone standard by 2021. The Clean Air Act allows nonattainment areas to "bump up" to a higher classification if more time is needed to attain the standard, if certain conditions are met. ARB believes that a reclassification to "extreme," is appropriate for the South Coast. An extreme classification would extend the attainment date to 2024, and acknowledges that some of the reductions needed for attainment will have to come from strategies that are outside of the scope of our currently available technologies and infrastructure.

The federal Clean Air Act recognizes that ozone nonattainment areas with an intractable problem, such as the South Coast, must rely on evolving technologies to meet attainment goals. The South Coast SIP consistent with the Clean Air Act (Section 182(e)(5)) will need to include a commitment to achieve additional reductions from long-term concepts.

PM2.5

Air quality data gathered over the past several years shows significant reductions in ambient PM2.5 levels throughout the region, particularly in the heavily populated western portion of the Basin. This progress appears to be independent of fluctuations in the weather. Nonetheless, high PM2.5 values are still recorded in the rapidly developing eastern portion of the District around Fontana and Rubidoux, where the PM2.5 design value still exceeds the PM2.5 standard by up to 50 percent. The South Coast's PM2.5 modeling indicates that significant reductions in ROG, NOx, SOx, and PM2.5 will be needed to attain the federal standard throughout the district, as shown in the following table.

The proposed State Strategy will achieve additional emission reductions on the order of about 20 percent for NOx, 45 percent for SOx, 10 percent for ROG, and 10 percent for diesel PM by 2015. These short term strategies are aggressive: they will strengthen and expand the motor vehicle smog check program; lead to more rapid turnover of older trucks and off-road equipment used in construction, land and water-based recreational vehicles; lower the sulfur content in fuels; modernize and clean up port-related operations; and tighten performance standards for engines and equipment that are regulated by the federal government (e.g., interstate trucks, construction and agricultural equipment, and locomotives).

Unfortunately, the State Strategy must build upon U.S. EPA's new engine standards for off-road sources for which ARB cannot establish State new engine emission standards. These standards are phasing in from 2010 to 2015 or later. This schedule provides only limited turnover and replacement of diesel engines prior to the 2015 PM2.5 attainment date. Cost is not the only issue: it is not likely that enough clean engines would be manufactured to bring emissions down to the South Coast carrying capacity even if funding were available to spur early replacement.

The result of these constraints is that it may not be possible to reduce emissions to the PM2.5 carrying capacity identified by the District by 2015. The attainment demonstration play will likely be updated at least once prior to the attainment deadline, which would allow us to incorporate new controls. ARB's analysis of historical emissions and PM2.5 air quality trends also indicates that reductions identified in the State Strategy are likely be more effective in reducing ambient PM2.5 levels that the district's modeling indicates. Future plan updates would reflect more air quality data, and possibly improved modeling.

Status for PM2.5 Model

(South Coast Air Basin, Summer Season emissions, tons per day)

	NOx	SOx	ROG	PM2.5
2006 Current Emissions	972	63	732	100
2015 Carrying Capacity	421	19	457	84
Total Reductions Needed	**551**	**44**	**275**	**16**
Reductions between 2006 and 2015 (Existing Program)	319	18	165	2
New State Measures in 2014	125	20	55	9
New District Measures in 2014	8	3	7	1
TOTAL REDUCTIONS FROM MEASURES	**452**	**41**	**227**	**12**
2014 Shortfall	***99***	***3***	***48***	***4***

In its October draft plan, the South Coast Air Quality Management District recommended a State Strategy that District staff believes would allow attainment of the PM2.5 standard by 2015. The District's proposed measures are assumed to achieve an additional 100 tons per day NOx reductions by 2015. ARB staff has met with District staff to try to understand these assumptions and determine if additional reductions are feasible in the 2015 timeframe.

Proposed State Strategy

Air quality modeling and data analysis have demonstrated NOx reductions are needed for reducing both PM2.5 and ozone concentrations in the South Coast Air Basin. By applying a NOx control focus to attain the near-term PM2.5 standard in the South Coast, we can make significant progress toward attaining the 8-hour ozone standard by 2024. ARB's mobile source NOx measures are essential to attainment of both ozone and PM2.5 standards on the South Coast.

Mobile source controls have been the bedrock of ARB's emission reduction strategy since the agency's inception in 1967. Clean vehicles, engines, and fuels have been developed to respond to California's new vehicle emission standards, which then allowed U.S. EPA and other nations to enact similar requirements. As a world leader in air pollution control, the ARB has a proven record of spurring

the continuous improvements in mobile source emission technologies and fuels. The existing vehicle control program provides a healthy down payment on the needed reductions: in 2020 combined ROG and NOx emissions from on-road cars and trucks are projected to be 60 percent lower than they are today, despite significant increases in population, and vehicle use. Overall, the existing mobile source program is expected to reduce mobile source emissions by over 40 percent in 2020 when compared to 2006 levels. Attaining the ozone standard in the South Coast will require even more reductions from all sectors – it will require us to clean up remaining higher polluting vehicles in the on-road sector, and to secure commensurate reductions from most off-road sources.

Mobile sources play such a dominant role in the South Coast Air Basin that the rate at which their emissions can be reduced is also key to determining how quickly the region can meet ambient air quality standards. In an area whose economy depends on moving and delivering products, construction, and a highly mobile workforce, the cost of reducing mobile source emissions must be considered when designing a clean air plan.

ARB's existing mobile source program has resulted in development of progressively cleaner cars and trucks (see below). More recent regulations bring cleaner forklifts and other off-road equipment to the California market. As a result, much of the remaining mobile source problem in 2023 will come from older cars, trucks, and off-road equipment. ARB's adopted SIP strategies are discussed in Section C-3, and the proposed new strategies in Section C-4.

The State Strategy lays out an aggressive program for cleaning up California's "legacy fleet" of diesel engines by requiring older equipment to be retrofitted with controls, upgraded with engines, or replaced with newer equipment. The availability of new engines and control devices places a real constraint on the speed at which we can impose clean-up requirements. The cost that individual businesses must pay to retrofit existing equipment or replace it ahead of schedule is another consideration.

The State Strategy is technologically and economically challenging. It relies in large part on replacing or retrofitting hundreds of thousands of trucks and off-road engines. The strategy must take into account the ability of manufacturers to meet the demand for new market ready, reliable, low-emitting engines and equipment. Because California shares regulatory responsibility with the federal government for the control of interstate trucks, construction equipment, trains and ships, we must also rely on our federal partners to match the State's commitment to set new technology-based standards.

Regulations have been and will continue to be ARB's primary mechanism for reducing emissions. Beginning in the 1990s, California complemented its command-and-control regulatory structure with market-based strategies. This approach has successfully incentivized the early retrofit of existing equipment,

financed the development and commercialization of new technologies, and accelerated the turnover of existing, higher polluting engines and equipment. California has invested more than 140 million dollars to date to clean up dirty trucks, buses, and agricultural equipment through the Carl Moyer Memorial Air Quality Standards Attainment Program. This investment is reducing smog-forming oxides of nitrogen emissions by approximately 7,000 tons annually, equivalent to taking more than 700,000 cars off the road. Other incentive programs have supported the purchase of low-emission vehicles and old car buy-back (light-duty scrap) programs. We expect that the South Coast will continue its incentive programs to reduce emissions in support of the SIP.

Although incentive programs are both popular and effective, they often involve the allocation of public funds that are in limited supply. An additional source of public funding involves the use of state general obligation bonds. In 2006, California voters approved the use of $1 billion in bond funding to reduce goods movement related air emissions. ARB is now developing the plans and guidelines for the distribution of these funds. On January 24, 2007, Governor Schwarzenegger issued Executive Order S-02-07 to ensure fiscal responsibility in the use of moneys generated by general obligation funds. ARB will submit an accountability structure as required by March 1, 2007, as required by the Executive Order.

Reasonable Further Progress Reductions from Existing Programs

The South Coast meets its progress targets through 2014 purely on the basis of ROG reductions from the existing control program. From 2017 forward, the South Coast will need to use both ROG and NOx reductions from the existing control program. No reductions from proposed new measures are needed for progress purposes.

	Milestone year					
	2008	**2011**	**2014**	**2017**	**2020**	**2023** (2024 attainment)
ROG or NOx percent reduction required from 2002 levels	18%	27%	36%	45%	54%	63%
ROG percent reduction projected from 2002 levels used to meet RFP	18.0%	27.0%	36.0%	39.1%	40.3%	40.6%
NOx percent reduction projected from 2002 levels used to meet RFP	0.0%	0.0%	0.0%	5.9%	13.7%	22.4%
Total ROG and/or NOx percent reductions used to meet RFP	18.0%	27.0%	36.0%	45.0%	54.0%	63.0%
RFP percent reduction requirements met?	Yes	Yes	Yes	Yes	Yes	Yes